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THE MOSQUITOES OF NORTH AND CENTRAL AMERICA AND THE WEST INDIES

BY
LELAND O. HOWARD, HARRISON G. DYAR,
AND FREDERICK KNAB

VOLUME FOUR

SYSTEMATIC DESCRIPTION (IN TWO PARTS)

PART II

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PART II

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Tribe CULICINI—Continued.

Genus PSOROPHORA Robineau-Desvoidy.

Psorophora Robineau-Desvoidy, Mém. Soc. Hist. nat. Paris, iii, 412, 1827.
Psorophora Walker, Cat. Brit. Mus., Dipt., i, 2, 1848.
Culex Walker (in part), Cat. Brit. Mus., Dipt., i, 2, 1848.
Sabethes Walker (not Robineau-Desvoidy), Cat. Brit. Mus., Dipt., i, 1, 1848.
Psorophora Lynch-Arribálzaga, Rev. Mus. de la Plata, i, 374, ii, 138, 1891.
Janthinosoma Lynch-Arribálzaga, Rev. Mus. de la Plata, i, 374, ii, 152, 1891.
Psorophora Giles, Gnats or Mosq., 178, 1900.
Sabethes Giles (in part), Gnats or Mosq., 183, 1900.
Psorophora Coquillett, U. S. Dept. Agr., Div. Ent., Circ. 40, 2 Ser., 4, 1900.
Psorophora Howard, U. S. Dept. Agr., Div. Ent., Bull. 25, 45, 1900.
Psorophora Howard, Mosquitoes, 144, 1901.
Conchyliastes Howard, Mosquitoes, 155, 1901.
Psorophora Theobald, Journ. Trop. Med., iv, 235, 1901 (without species).
Janthinosoma Theobald, Journ. Trop. Med., iv, 235, 1901 (without species).
Janthinosoma Theobald, Mon. Culic., i, 253, 1901.
Psorophora Theobald, Mon. Culic., i, 259, 1901.
Conchyliastes Howard, Mosquitoes, 3 ed., 155, 1902.
Janthinosoma Giles, Gnats or Mosq., 2 ed., 335, 337, 1902.
Psorophora Giles, Gnats or Mosq., 2 ed., 335, 343, 1902.
Psorophora Neveu-Lemaire, C. R. Soc. Biol. Paris, liv, 1331, 1902.
Culex Neveu-Lemaire (in part), Mém. Soc. zool. France, xv, 210, 1902.
Psorophora Neveu-Lemaire, Mém. Soc. zool. France, xv, 216, 1902.
Janthinosoma Theobald, Mon. Culic., iii, 124, 1903.
Psorophora Theobald, Mon. Culic., iii, 130, 1903.
Psorophora Johannsen, N. Y. State Mus., Bull. 68, 390, 391, 392, 410, 1903.
Conchyliastes Johannsen, N. Y. State Mus., Bull. 68, 392, 1903.
Psorophora Coquillett, Rev. de Med. Trop., iv, 113, 1903.
Grabhamia Theobald (in part), Mon. Culic., iii, 243, 1903.
Psorofora Lutz in Bourroul, Mosq. do Brasil, 61, 1904.
Psorophora Felt, Bull. 79, N. Y. State Mus., 265, 391a, 1904.
Janthinosoma Lutz in Bourroul, Mosq. do Brasil, 60, 1904.
Janthinosoma and *Psorophora* Lahille, Class. des Moust., 16, 1904.
Janthinosoma Felt, N. Y. State Mus., Bull. 79, 271, 391a, 1904.
Grabhamia Felt, N. Y. State Mus., Bull. 79, 391b, 1904.
Psorophora Dyar, Proc. Ent. Soc. Wash., vii, 45, 46, 1905.
Janthinosoma Dyar, Proc. Ent. Soc. Wash., vii, 45, 47, 1905.
Psorophora Theobald, Gen. Ins., Dipt., 26 fasc., 14, 16, 1905.
Janthinosoma Theobald, Gen. Ins., Dipt. fasc. 26, 14, 16, 1905.
Grabhamia Theobald (in part), Gen. Ins., Dipt. fasc. 26, 15, 23, 1905.
Feltidia Dyar, Proc. Ent. Soc. Wash., vii, 45, 47, 1905.
Psorophora Blanchard, Les Moustiques, 237, 1905.
Janthinosoma Blanchard, Les Moustiques, 231, 1905.
Grabhamia Blanchard (in part), Les Moustiques, 396, 1905.
Grabhamia Theobald (in part), Mosq. or Culic., Jamaica, 7, 1905.
Grabhamia Felt, Bull. 97, N. Y. State Mus., 472, 1905.
Psorophora Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 178, 179, 1906.
Janthinosoma Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 178, 181, 1906.
Ceratocystia Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 178, 183, 1906.
Psorophorinae Mitchell, Psyche, xiii, 21, 1906.
Grabhamia Coquillett, Science, n. s., xxiii, 313, 1906.
Lepidosia Coquillett, Science, n. s., xxiii, 314, 1906.
Psorophorinae Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 14, 1906.
Psorophora Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 14, 1906.
Lepidosia Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 15, 16, 1906.
Janthinosoma Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 15, 17, 1906.
Grabhamia Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 15, 21, 1906.

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Janthinosoma Theobald, Mon. Culic., iv, 148, 152, 1907.
Psorophora Theobald, Mon. Culic., iv, 148, 158, 1907.
Grabhamia Theobald (in part), Mon. Culic., 150, 284, 1907.
Janthinosoma Autran, Anal. Dep. Nac. Hig., xiv, 11, 1907.
Psorophora Autran, Anal. Dep. Nac. Hig., xiv, 15, 1907.
Psorophora Dyar & Knab, Can. Ent., xxxix, 48, 1907.
Aëdes Dyar & Knab (in part), Can. Ent., xxxix, 48, 1907.
Psorophora and *Janthinosoma* Howard, Osler's Modern Medicine, i, 372, 1907.
Psorophora Williston, Man. No. Am. Dipt., 3 ed., 108, 1908.
Aëdes Williston (in part), Man. No. Am. Dipt., 3 ed., 108, 1908.
Janthinosoma and *Psorophora* Peryassú, Os Culic. do Brazil, 34, 1908.
Janthinosoma and *Psorophora* Pazos, San. y Ben., ii, 40, 1909.
Grabhamia Pazos (in part), San. y Ben., ii, 40, 1909.
Aëdes Pazos (in part), San. y Ben., ii, 43, 1909.
Janthinosoma Theobald, Mon. Culic., v, 112, 118, 1910.
Psorophora Theobald, Mon. Culic., v, 112, 123, 1910.
Grabhamia Theobald (in part), Mon. Culic., v, 116, 277, 1910.

The type species are: Of *Psorophora* Robineau-Desvoidy, *Culex ciliata* Fabricius; of *Janthinosoma* Arribálzaga, *Culex discrucians* Walker; of *Grabhamia* Theobald, *Culex jamaicensis* Theobald; of *Conchyliastes* Howard, *Culex musicus* Say; of *Feltidia* Dyar, *Culex jamaicensis* Theobald; of *Ceratocystia* Dyar & Knab, *Culex discolor* Coquillett; of *Lepidosia* Coquillett, *Culex cyanescens* Coquillett.

GENERIC DIAGNOSIS OF ADULT:

Proboscis moderate; palpi short or moderately long in the female, never more than half the length of the proboscis; those of the male longer than the proboscis. Head elongate, the occiput broad and exposed. Antennæ of the female filiform, the joints subequal, with basal whorls of sparse, rather short hairs; those of the male plumose, the last two joints long, the others short and thickened at the insertions of the hair whorls. Prothoracic lobes remote dorsally, the prothorax produced into a collar-like neck. Mesonotum projecting anteriorly, arcuate, with setæ on the disk. Scutellum trilobate. Clypeus and postnotum nude. Abdomen subcylindrical in the female, tapered at the tip, the cerci prominent, the eighth segment entirely membranous and completely retractile; that of the male elongate, depressed, with abundant lateral ciliation. Wings rather narrow in some species, broad in others; smoky in most species, particularly towards the costa. Legs moderate, the hind tibial scraper with a row of spines. Claws of the female toothed or simple; unequal and toothed, at least in part, in the male.

GENERIC DIAGNOSIS OF LARVA:

The larvæ divide into two groups which show striking differences correlated to habits. The larvæ of the one group, which constitutes *Psorophora* in the sense heretofore recognized, are predaceous; those of the second group, the subgenus *Janthinosoma* feed in the ordinary manner upon small particles suspended in the water. The adoption of the predaceous habit has led to a profound modification of the entire head in the first group and the two subgenera are best defined separately.

Subgenus *Psorophora*: Head broad, subquadrate, broadest at or behind the eyes. The mouth brushes are well separated, inserted upon lateral prominences of the front; the elements of the brushes are coarse, hooked at the apex and serrate along their inner margins. Antennæ small and inserted well back on the sides of the head. The maxillæ are broad, quadrate. Head hairs small, single. Lateral comb of the eighth segment of many scales in a single row, sometimes attached to a plate, in most species preceded by a large patch of minute rudimentary scales. Air-tube somewhat fusiform, usually rather long, the pecten teeth produced into hairs and followed by a hair-tuft. Anal segment completely ringed by the chitinous plate; ventral brush well developed and extending into the plate. Anal gills four, equal.

Subgenus *Janthinosoma:* Head rounded, rather broad. Mouth brushes normal in position, composed of fine hairs. Antennæ inserted upon prominent anterior angles of the head, of moderate or large size, in one species inflated, the tuft near the middle. Maxillæ prominent, conical. Head hairs variously developed. Lateral comb of the eighth segment of a few large scales usually attached to a weakly developed plate; the scales are broad and flat and have several large spines. Air-tube large, inflated in all but one species, with only a few broad pecten teeth. Anal segment ringed, ventral brush well developed and extending into the plate. Anal gills four, variously developed, nearly obsolete in the salt-water species.

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In the larvæ of both subgenera the anal plate surrounds the segment and the ventral brush is partly inserted within it. A peculiarity of all the larvæ of the genus is that the air-tube is only completely chitinized in the last stage. In the first three stages the air-tube is only chitinized apically while the basal portion is membranous.

The genus *Psorophora* is confined to America. It extends throughout the tropics and well into the temperate regions of both continents, especially on the Atlantic side.

The genus is a well-marked one, but stands on characters other than those originally designated. The more striking species were early taken out of *Culex* and have been kept separate by all authors except some of the early ones. The genus is a development from *Aëdes* and falls into two subgenera, *Psorophora* and *Janthinosoma,* on the characters of the larvæ. The peculiar spiny eggs are the same in both, and the male genitalia and the other adult characters are of the same type throughout. The larvæ of the two groups differ particularly in the mouth-parts, but these can not be expected to be an index to relationship, as they are the very parts most profoundly modified in adaptation to habits. The serrate character of the mouth-brushes, which has been used in classification, is repeated in certain species of *Aëdes* and is therefore not diagnostic.

The difference in the structure of the claws of the female, has probably no greater significance than indicating a difference in the manner of copulating. Although colorational differences mark off the forms with simple claws, there is nothing in the structure of other parts, of the male genitalia or of the larvæ, that would admit of their separation. On the other hand the close relationship is unmistakable.

The larvæ live in temporary pools in the ground, formed by rains. They develop with the greatest rapidity, hatching immediately after a rain has filled the hollows where the eggs have been lying, and proceeding with the four larval stages as quickly as possible, sometimes in as many days.

The eggs are laid singly, on the ground, probably in the dry hollows where water usually collects after rains. They have a spinose covering. This probably preserves them from desiccation while the puddles are dry. It is essential that the development should proceed as rapidly as possible, as these transient puddles often dry up in a few days. Indeed, they often dry so soon as to preclude the development of any adults. A second rain, following the first within a few days, is usually essential to secure a successful brood. The eggs from one brood do not all hatch when submerged the first time, and some of them hatch after every considerable rain.

The winter, or the dry season, is passed in the egg state. The adults of the larger species are rather severe biters and, owing to their size, can puncture the skin of a man through a considerable thickness of clothing. A number of the smaller species apparently do not attack man but feed upon other warm-blooded animals. We have no observations on their mating habits.

Tables of the Species.

Adults, structure and coloration.

1. **Mesonotum with smooth nude areas** **2**
   Mesonotum entirely scaled **6**
2. **Mesonotum with median stripe of golden scales** ..... ***ciliata* Fabricius (p. 530)**
   Mesonotum without such stripe **3**
3. **Legs with prominent outstanding scales** **4**
   Legs without prominent outstanding scales **5**
4. **Tips of the hind femora white; leg-scales fine and dense, dark violet** ***æva* Dyar & Knab (p. 536)**
   Tips of hind femora obscure grayish; leg-scales coarsely squamose, iridescent ***cilipes* Fabricius (p. 538)**

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5. Abdomen with green metallic reflection..... *virescens* Dyar & Knab (p. 541)
Abdomen with blue metallic reflection..... *howardii* Coquillett (p. 544)
6. Claws of the female toothed..... 7
Claws of the female simple..... 16
7. Hind legs with raised scales (as long or longer than the scale)..... 8
Hind legs without such raised scales..... 13
8. Thorax without median dark stripe..... 9
Thorax dark scaled centrally..... 11
9. Abdomen with the segments below banded with blue-black at the base..... 10
Abdomen with the segments below wholly yellow scaled except at tip
sayi Dyar & Knab (p. 554)
10. Last two joints and tip of the third of hind tarsi white
posticatus Wiedemann (p. 548)
Last two joints only of hind tarsi white..... variety *echinata* Grabham (p. 552)
11. Last two joints of hind tarsi white..... 12
Last joint only of hind tarsi white..... *terminalis* Coquillett (p. 552)
12. Scutellum dark scaled, no pale scales around antescutellar space
lutzii Theobald (p. 557)
Scutellum yellow scaled, a short yellow line beside the antescutellar space
chamberico Dyar & Knab (p. 563)
Scutellum white-scaled, antescutellar space with a broad patch of whitish scales on each side..... *horridus* Dyar & Knab (p. 561)
13. Penultimate joint of hind tarsi white, the last black..... 14
Last two joints of hind tarsi white; the mesonotum with black and golden scales mixed ..... *pansei* Pazos (p. 565)
Last joint of the hind tarsi white..... *mexicanus* Bellardi (p. 564)
Hind feet without white..... *cyanescens* Coquillett (p. 567)
14. Thorax dark-scaled in the middle..... *discrucians* Walker (p. 569)
Thorax all yellow-scaled 15
15. Tips of mid and hind femora dusky..... *coffini* Dyar & Knab (p. 574)
Tips of mid and hind femora white..... *johnstonii* Grabham (p. 572)
16. First hind tarsal joint with a broader middle pale ring..... 17
First hind tarsal joint with a narrower middle white ring..... 18
First hind tarsal joint without a middle white ring..... 22
17. Wings with the costa pale and two distinct black spots beyond the middle
signipennis Coquillett (p. 575)
Wings not so marked..... *discolor* Coquillett (p. 578)
18. Mesonotal vestiture predominatingly golden brown..... 19
Mesonotal vestiture tinged with violet blue..... 20
19. White ring of first hind tarsal joint less than one-third of the joint
jamaicensis Theobald (p. 581)
This white ring one third or over..... *texanum* Dyar & Knab (p. 585)
20. Pale abdominal bands powdery, interrupted medianly and irregular; darkly colored; the third vein with scale tufts throughout
floridense Dyar & Knab (p. 586)
Pale abdominal bands extensive, broken only on the distal segments; less darkly colored; third vein with scale tufts mostly at base..... 21
21. Abdomen extensively pale scaled, bands indistinct; third vein with broad scales in a basal dot; scutellum without silvery luster
columbiæ Dyar & Knab (p. 590)
Abdomen less strongly pale-scaled posteriorly; third vein with broad scales extending well outward; scales on scutellum with a silvery luster
toltecum Dyar & Knab (p. 588)
22. Wings with dark scales only..... 23
Wings with whitish and dark scales..... 24
23. Thorax dark reddish-brown with two white spots on the disk
infine Dyar & Knab (p. 594)
Thorax dull brown with yellowish and white scales in diffuse patches
cingulatus Fabricius (p. 597)
24. Thorax dull golden scaled with brown spots and silvery mottling
pygmæa Theobald (p. 600)
Thorax dull silvery scaled with faint median golden stripe..... 25
25. Legs black, white speckled..... *haruspicus* Dyar & Knab (p. 603)
Legs pale, the yellowish scales predominating.. *insularius* Dyar & Knab (p. 605)

MALE GENITALIA.

1. Clasp-filament mesially inflated..... 6
Clasp-filament branched, distorted or simple, not mesially inflated..... 2

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2. Harpago with slightly expanded tip bearing a row of setæ..... 3
Harpago with large circular capitate tip, covered with setæ..... 5
3. Tip of harpago widened; clasp filament widened outwardly, smooth
sæva Dyar & Knab (p. 537)
Tip of harpago widened; clasp filament slender, bent at tip, with a row of setæ within 4
4. Tip of harpe simply sharply pointed..... *ciliipes* Fabricius (p. 540)
Tip of harpe notched, the point arising from apex..... *ciliata* Fabricius (p. 533)
5. Inner lobe of the clasp filament slender, the tip bent at right angles
virescens Dyar & Knab (p. 543)
Inner lobe of clasp filament stouter, the apical part bent over
howardii Coquillett (p. 546)
6. Outer filament of harpago expanded and curled { *posticatus* Wiedemann (p. 551); *sayi* Dyar & Knab (p. 556); *horridus* Dyar & Knab (p. 562); *pazosi* Pazos (p. 566) }
Outer filament expanded but not curled..... *discolor* Coquillett (p. 579)
Outer filament not enlarged, similar to the others..... 7
7. Filaments of the harpago long..... { *jamaicensis* Theobald (p. 584); *toltecum* Dyar & Knab (p. 589); *columbiæ* Dyar & Knab (p. 592); *floridense* Dyar & Knab (p. 587); *cingulatus* Fabricius (p. 598); *infine* Dyar & Knab (p. 596) }
Filaments of the harpago short..... 8
8. Clasp filament expanded, smooth..... { *haruspicus* Dyar & Knab (p. 605); *pygmæa* Theobald (p. 602); *insularius* Dyar & Knab (p. 606); *signipennis* Coquillett (p. 577) }
Clasp filament expanded, roughened and spiny on the margin
cyanescens Coquillett (p. 568)

The following species are omitted, as we possess no males: *terminalis* Coq., *mexicanus* Bell., *coffini* D. & K., *lutzii* Theob., *discrucians* Walk., *texanum* D. & K., *champerico* D. & K., *johnstonii* Grabh.

LARVÆ.

1. Mouth brushes well separated, prehensile..... 14
Mouth brushes normal..... 2
2. Antennæ long and prominent, longer than the head..... 3
Antennæ moderate or short, shorter than the head..... 8
3. Antennæ strongly inflated and distorted..... *discolor* Coquillett (p. 580)
Antennæ not so..... 4
4. Anal segment longer than wide..... 5
Anal segment shorter than wide..... 7
5. Comb of the eighth segment of six or seven subequal spines..... 6
Comb of five spines, the upper and lower small.... *discrucians* Walker (p. 571)
6. Antennæ stouter, more heavily spined..... *posticatus* Wiedemann (p. 551)
Antennæ less stout, less heavily spined..... *sayi* Dyar & Knab (p. 556)
7. Pecten teeth of the tube with 4 long sharp spines.. *infine* Dyar & Knab (p. 596)
Pecten teeth of the tube with two rounded branches
cingulatus Fabricius (p. 599)
8. Air-tube fusiform, inflated; anal gills normal..... 9
Air-tube barrel-shaped; teeth of comb separate; anal gills bud-shaped..... 13
9. Air-tube with two long hairs at the tip..... *cyanescens* Coquillett (p. 568)
Air-tube without such hairs..... 10
10. Antennæ black on the outer half; tube with four or five pecten teeth scattered along basal half..... 11
Antennæ all pale; the four spines of the tube restricted to the basal third of the tube..... *signipennis* Coquillett (p. 577)
11. Air-tube pecten of two to four teeth..... 12
Air-tube pecten of four to five teeth..... { *columbiæ* Dyar & Knab (p. 592); *floridense* Dyar & Knab (p. 588); *toltecum* Dyar & Knab (p. 590) }
12. Antennæ nearly as long as head; dorsal head-hairs multiple
jamaicensis Theobald (p. 584)
Antennæ half as long as the head; dorsal head-hairs single
pygmæa Theobald (p. 602)

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13. Pecten teeth of tube with long secondary spine. *insularius* Dyar & Knab (p. 607)
Pecten teeth of tube less distinctly spined.... *haruspicus* Dyar & Knab (p. 605)
14. Air-tube pecten running far beyond the middle, the tuft subapical *cilipes* Fabricius (p. 540)
Air-tube pecten not or scarcely exceeding the middle, the tuft well within the outer third 15
15. Air-tube long, over 5 × 1 at base..... *sæva* Dyar & Knab (p. 537)
Air-tube shorter, four times as long as wide or less..... 16
16. Hairs of the air tube pecten long, six times as long as the body of the scale *ciliata* Fabricius (p. 533)
Hairs of the air-tube pecten shorter, three times as long as the body of the scale 17
17. Small scales of the comb chiefly narrow, longer than wide *virescens* Dyar & Knab (p. 543)
Small scales of the comb chiefly broad, wider than long *howardii* Coquillett (p. 546)

The following species are omitted, as the larvæ are unknown: *terminalis* Coq., *lutzii* Theob., *horridus* D. & K., *champerico* D. & K., *mexicanus* Bell., *pazosi* Paz., *johnstonii* Grabh., *coffini* D. & K., *texanum* D. & K.

Subgenus PSOROPHORA Robineau-Desvoidy.

PSOROPHORA CILIATA (Fabricius) Robineau-Desvoidy.

Culex ciliata Fabricius, Ent. Syst., iv, 401, 1794.
Culex ciliata Coquebert de Montbret, Ill. Iconogr. Ins., 121, pl. 27, f. 7, 1804.
Culex ciliatus Fabricius, Syst. Antl., 35, 1805.
Culex molestus Wiedemann, Dipt. Exot., 7, 1821.
Culex ciliatus Wiedemann, Dipt. Exot., 36, 1821.
Culex tibialis Robineau-Desvoidy, Mém. Soc. Hist. nat. Paris, iii, 404, 1827.
Culex rubidus Robineau-Desvoidy, Mém. Soc. Hist. nat. Paris, iii, 404, 1827.
Psorophora ciliata Robineau-Desvoidy, Mém. Soc. Hist. nat. Paris, iii, 413, 1827.
Psorophora boscii Robineau-Desvoidy, Mém. Soc. Hist. nat. Paris, iii, 413, 1827.
Psorophora molesta Robineau-Desvoidy, Mém. Soc. Hist. nat. Paris, iii, 413, 1827.
Culex ciliatus Wiedemann, Ausser. zweifl. Ins., i, 3, 1828.
Culex ciliatus Macquart, Hist. Nat. des. Ins., Dipt., i, 36, 1834.
Psorophora ciliata Walker, Cat. Brit. Mus., Dipt., i, 2, 1848.
Culex ciliatus Walker, Cat. Brit. Mus., Dipt., i, 2, 1848.
Culex ciliatus Macquart, Mém. Soc. Sci. d'Agric. Lille, 1850, 315, 1850.
Culex ciliatus Macquart, Dipt. Exot., 4 suppl., 315, 1850.
Culex conterrens Walker, Ins. Saund., Dipt., 427, 1856.
Culex perterrens Walker, Ins. Saund., Dipt., 431, 1856.
Culex ciliatus Osten Sacken, Cat. N. Am. Dipt., 2 ed., 18, 218, 1878.
Psorophora ciliata Lynch Arribálzaga, Rev. del Mus. de la Plata, ii, 140, 1891.
Psorophora ciliata Howard, Dept. Agr., Div. Ent., Bull. 4, n. s., 23, 1896.
Psorophora ciliatus Coquillett, U. S. Dept. Agr., Div. Ent., Circular 40, 2 Ser., 7, 1900.
Psorophora ciliatus Howard, U. S. Dept. Agr., Div. Ent., n. s., Bull. 25, 22, 1900.
Psorophora ciliata Howard, Can. Ent., xxxii, 353, 1900.
Psorophora ciliata Giles, Gnats or Mosq., 179, 1900.
Psorophora boscii Giles, Gnats or Mosq., 181, 1900.
Culex tibialis Giles, Gnats or Mosq., 262, 1900.
Culex conterrens Giles, Gnats or Mosq., 284, 1900.
Culex rubidus Giles, Gnats or Mosq., 309, 1900.
Psorophora ciliata Theobald, Mon. Culic., i, 261, 1901.
Psorophora ciliata Howard, Mosquitoes, 144, 1901.
Psorophora ciliata Dyar, Proc. Ent. Soc. Wash., v, 51, 1902.
Psorophora ciliata Dupree & Morgan, Science, n. s., xvi, 1037, 1902.
Psorophora ciliata Giles, Gnats or Mosq., 2 ed., 345, 1902.
Psorophora ciliata Theobald, Mon. Culic., iii, 130, 1903.
Psorophora ciliata Harris, Ent. News, xiv, 232, 1903.
Psorophora ciliata Johannsen, Bull. 68, N. Y. State Mus., 411, 1903.
Psorophora ciliata Morgan & Dupree, U. S. Dept. Agr., Div. Ent., Bull. 40, n. s., 91, 1903.
Psorophora ciliata Smith, N. J. Agr. Exp. Stat., Bull. 171, 34, 1904.
Psorophora ciliata Felt, Bull. 79, N. Y. State Mus., 272, 1904.

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Psorophora ciliata Dyar, Journ. N. Y. Ent. Soc., xii, 244, 1904.
Psorophora ciliata Lutz in Bourroul, Mosq. do Brasil, 71, 1904.
Psorophora ciliata Dyar, Journ. N. Y. Ent. Soc., xiii, 23, 1905.
Psorophora ciliata Blanchard, Les Moustiques, 239, 1905.
Psorophora centaurus Theobald, Gen. Ins., Culic., 16, 1905.
Psorophora ciliata Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 173, 1905.
Psorophora ciliata Felt, Bull. 97, N. Y. State Mus., 448, 471, 1905
Psorophora ciliata Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 14, 1906.
Psorophora ciliata Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 179, 180, 1906.
Psorophora ciliata Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 1, 1906.
Psorophora ciliata Quayle, Univ. Cal. Agr. Exp. Stat., Bull. 178, 52, 1906.
Psorophora ciliata Theobald, Mon. Culic., iv, 159, 1907.
Psorophora ciliata Dyar, Proc. U. S. Nat. Mus., xxxii, 122, 1907.
Psorophora ciliata Autran, Anal. Dep. Nac. Hig., xiv, 16, 1907.
Psorophora ciliata Peryassú, Os Culic. do Brazil, 43, 156, 1908.
Psorophora ciliata Viereck, 1st Ann. Rept. Comm. Health Pa., 471, 1908.
Psorophora ciliata Thibault, Proc. Ent. Soc. Wash., xii, 21, 1910.
Psorophora ciliata Theobald, Mon. Culic., v, 124, 1910.
Psorophora ciliata Morse, Ann. Rept. N. J. State Mus., 1909, 716, 1910.

ORIGINAL DESCRIPTION OF CULEX CILIATA:

C. niger thoracis linea dorsali pedibusque flavis, tibiis ciliatis.
Habitat in Carolina Mus. Dom. Bosc.
Paullo praecedente [*hæmorrhoidalis*] minor. Antennae filiformes, verticillatae, cinerascentes. Rostrum flavescens, apice nigrum. Caput nigrum atomis niveis. Thorax gibbus ater linea dorsali laete flava. Abdomen cylindricum, nigrum, immaculatum. Alae obscurae margine tenuiori valde ciliato. Pedes testacei tibiis omnibus tarsisque posticis valde ciliatis.

ORIGINAL DESCRIPTION OF CULEX MOLESTUS:

Fuscus, thorace flavo-alboque-vittato; pedibus flavis nigro-alboque-fasciatis. Longit. lin. 4. ♀. Georgia Amer.
Antennae fuscae. Proboscis et palpi ferrugineo-flavicantia apice nigro-fusca; caput niveo-tomentosum. Thorax fuscus, vitta media laete ferruginea, lateralibusque niveis; pleurae fuscae tomento niveo. Abdomen fuscum, vitta ferrugineo-flavicante. Pedes ferrugineo-flavicantes, femorum apex fusco-niger; tibiae ima basi nivei, ceterum vellere fusco-nigro munitae. Tarsorum singuli articuli basi nivei, ceterum vellere fusco-nigro tecti. Mus. nostrum.

ORIGINAL DESCRIPTION OF CULEX TIBIALIS:

Niger, tomento cinereo-fusco. Antennæ flavo-bruneæ. Femora lutea, apice nigro ciligero; tibiis nigris, ciliis validis; tarsorum articulo primo flavo ciligero.
Long. 4–6 lineas.
♂ Antennae flavo-bruneæ; palpi proboscisque fusci. Corpus nigrum, tomento cinereo-fusco. Femora mellea, apice nigro ciligeroque. Tibiæ atræ validèque ciligeræ. Tarsorum articulus primus melleus apice nigro et ciligero; reliquis articulis similibus. Alæ leviter subfuliginosæ, nervis brunicoso-villosis.
Habitat in Brasiliâ . . . . (Museum Dejeanianum.)

ORIGINAL DESCRIPTION OF CULEX RUBIDUS:

Antennae brunicosae. Thorax rubidus. Abdomen, maculis trigonis flavescentibus. Pedes flavi: tarsi posteriores atro-ciligeri.
Long. 4½ lineas. ♀
Proboscis flavescens, apice bruneo. Antennae brunicosae. Palpi bruneo-flavescentes. Thorax rubidus, dorso nigro vittato. Abdomen brunicans, maculis trigonis lateribus flavescentibus. Tarsi posteriores atro-ciligeri. Alae brunicoso-flavescentes, nervis villosis.
Habitat in Carolinâ . . . (Musaeum D. Serville.)

ORIGINAL DESCRIPTION OF PSOROPHORA BOSCII:

Flavo-pallida: pedes flavo-subfusci; alae, nervis villosis.
Long. 2½ lineas.
Omnes characteres *Ps. ciliatæ*. Tota pallidè flava. Thorax, dorso fulvescenti. Abdomen dorso vix subfuscum. Pedes flavo-subfusci. Alae, nervis villosis.
Habitat in Carolinâ. (Musaeum D. Bosc.)
Molesta, infesta, ab indigenis *Mosquite* et *Moustique* vocata.

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ORIGINAL DESCRIPTION OF CULEX CONTERRENS:

Foem. *Fusca; proboscis et palpi fulva, apice nigra; antennae nigrae, basi fulvae; thorax vitta dorsali testacea; pectus testaceum; pedes fulvi, robusti, femoribus tibiisque apice nigricantibus, tarsis nigricantibus albido fasciatis; alae subcinereae apud costam fuscescentes.*

Brown. Proboscis and palpi tawny, with black tips. Proboscis stout, straight, pubescent, as long as the head and the thorax. Antennae black, tawny at the base. Thorax with a testaceous dorsal stripe. Pectus testaceous. Abdomen wanting. Legs tawny, pubescent, very stout; tips of the femora and of the tibiæ blackish; tarsi blackish, with whitish bands. Wings grayish, brownish towards the costa; veins brown. Length of the body 4 ? lines; of the wings 6 lines.

United States.

ORIGINAL DESCRIPTION OF CULEX PERTERRENS:

Foem. *Fusca, sat valida; proboscis testacea, apice fusca; pectus testaceum; abdomen purpurascens, fasciis ventreque testaceis; pedes testacei, validi, pubescentes, femoribus tibiisque apice tarsisque fuscis; alae cinereae, venis nigricantibus subciliatis; halteres testacei.*

Brown, rather stout. Proboscis testaceous, long, brown towards the tip. Antennae brown, very little shorter than the proboscis. Pectus testaceous. Abdomen purplish, with a testaceous band on the fore border of each segment; under side testaceous. Legs testaceous, stout, pubescent; femora and tibiae brown towards the tips; tarsi brown. Wings gray; veins blackish, slightly ciliated. Halteres testaceous. Length of the body 4 lines; of the wings 6 lines.

South America.

DESCRIPTION OF FEMALE, MALE, LARVA, PUPA, AND EGG OF PSOROPHORA CILIATA:

Female.—Proboscis moderate, uniform, not tapered outwardly, the labellæ elongate, rounded triangular; pale brown, clothed with suberect, moderate, flat scales mostly blackish with a slight iridescent reflection, not concealing brown membrane; setæ rather numerous, black, short, not much longer than the scales. Palpi one-third as long as proboscis, rather densely clothed with suberect black scales and black setæ longer than those on proboscis. Antennæ slender; tori subspherical, yellowish brown, with a few hairs and scales within, succeeding, segments subequal, blackish, pilose, the second joint yellowish at base and bearing a few black scales; hairs of whorls sparse, black, not long. Clypeus prominent, roundedly subtruncate, nearly twice as long as wide, nude, shining, pale brown. Eyes black, contiguous at vertex. Occiput broad, well exposed, brown, rather sparsely covered with broad, curved white scales, leaving a narrow bare space along median suture, some black ones intermixed at the sides; a group of yellow setæ on vertex; numerous rather short dark-brown bristles, densest along margins of eyes but also distributed over entire surface.

Prothoracic lobes elliptical, small but prominent, remote, brown, rather densely covered with moderate black bristles. Mesonotum high and prominent before, smoothly arcuate, dark brown; a median dorsal stripe of dense, golden-yellow, narrow, curved scales, even, sharply limited, and extending over the ante-scutellar space nearly to scutellum, intermixed with short black bristles; on each side of this a bare stripe, each of about equal width to median stripe; bordering the bare stripes outwardly a narrow line of golden-yellow scales, again bordered outwardly by a narrow line of dense, black, narrow, curved scales mixed with black bristles; outwardly from these stripes a broad, irregular area of broad white scales extending to root of wing; ante-scutellar space white scaled and invaded by the median golden stripe; a broad bare stripe on each side of ante-scutellar space; humeri bare; sides of disk with short black bristles and towards roots of wings with pale-brown bristles. Scutellum trilobate, with some narrow, curved white scales, golden ones medianly, each lobe with numerous brown and yellowish bristles. Postnotum roundedly prominent, nude, brown, with a triangular blackish basal area. Pleurae sparsely clothed with flat white scales; coxæ shining brown with black scales and short dark bristles.

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Abdomen subcylindrical, flattened, strongly tapering posteriorly; rather densely clothed with broad, flat, thin scales, semitransparent, with an iridescent pearly luster, mostly whitish on the disk and along posterior borders of segments, blackish at the sides, the colors not distinctly separated; many short brownish bristles, most prominent at posterior margins of segments; sixth and seventh segments mostly white scaled; venter coarsely white scaled, each segment with an ill-defined median basal spot of black scales.

Wings large, rather broad, membrane smoky brownish, especially towards costa, veins brownish; petiole of second marginal cell shorter than its cell, of the second posterior cell slightly longer; basal cross-vein distant about half its own length from anterior cross-vein; scales black, very narrowly lanceolate, and ligulate, the outstanding ones longer and narrower. Halteres with pale stems and brown knobs.

Legs rather long and stout, appearing especially large owing to the numerous erect scales; femora yellowish, clothed for the most part with small, flat, blackish and yellowish iridescent scales, near tips with a broad band of dense, long and erect black scales; tibiæ brown, clothed with appressed, yellowish iridescent scales at base and beyond with dense, long, erect black scales, which have a slight iridescent luster, densest distally, forming broad black rings; fore and mid tarsi with first joint whitish scaled except at terminal third where it is black, second joint white at basal third, the other joints black, their scales not erect; hind tarsi with all the joints broadly white-ringed at the base, remaining portion clothed with dense black scales, erect on first and second joints. Claw formula, 1.1–1.1–1.1.

Length: Body about 9 mm.; wing 7.5 mm.

Male.—Proboscis straight, clothed with black scales on basal three-fifths, outer portion with yellowish-white scales, labellæ blackish. Palpi long, thickened outwardly, exceeding the proboscis by the length of the last two joints; long joint with a pale anchylosed articulation before the middle, last joint thickened, inflated; vestiture of black scales; outer portion of long joint and the last two joints densely clothed with long black hairs. Antennæ plumose, the joints short, except the last two; hairs of whorls very long and dense, blackish brown. Coloration similar to the female. Abdomen long, strongly depressed, parallel-sided, with abundant blackish lateral ciliation; a dorsal, median, integumentary yellow line. Wings narrower than in the female, the stems of the fork-cells longer; wing scales less abundant. Claw formula, 2.1–2.1–1.1.

Length: Body about 10 mm.; wing 7.5 mm.

Genitalia (plate 20, fig. 143): Side-pieces rather slender, twice as long as wide, without lobes, uniformly setose; clasp-filament uniformly thickened, arcuate, concavity outward, ending in a sharp angle at outer fourth, a row of short setæ within, a moderate terminal articulated spine. Harpes flattened, twisted, tip widely cleft, smooth; harpagones elongate, columnar, capitate, bearing a dense tuft of setæ and before the tip a single laminate appendage with a tapered recurved apex; unci moderately approximate, narrowly elliptical, with a recurved subapical inner angle; basal lobes rudimentary, transverse, bearing a few stout setæ.

Larva, Stage IV (see figure of the entire larva, plate 57).—Head quadrate, longer than wide, posterior angles rounded, eyes on an irregular prominence, antennæ inserted laterally on an angled prominence, front margin shallowly emarginate. Antennæ cylindrical, nearly uniform, sparsely spined all over, a single hair at outer fourth; four articulated terminal processes and a long spine, twice as long as processes. Eyes large, divided, the larger anterior half pointed. Both pairs of dorsal head-hairs single, approximate; ante-antennal tuft triple. Mouth-brushes inserted on outer angles of head, folded downward and back-

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wards. Mental plate broad and short, with a central tooth and eight on each side, all large and nearly equal. Mandible quadrangular, convex without, smooth, a single appendage near tip; an outer row of few coarse filamentous setæ; dentition of eight teeth, first and fifth long, especially the first, which is projecting and sharp, the others diminishing successively; four oblique, tooth-like projections below; a small projection at angle; a row of small setæ near base. Maxilla rounded rectangular, attachment oblique, the short palpus sessile on outer angle; various short spines and setæ on inner aspect. Palpus hardly longer than broad, with four rudimentary digits. Thorax rounded, about as long as wide, anterior margin strongly convex; lateral single hairs long, tufts short. Abdomen stout, the segments transverse, anterior ones strongly projecting laterally; long lateral hairs double to fifth segment, single on sixth; secondary hairs in small tufts. Tracheal tubes broad, band-shaped, nearly even. Air-tube stout, conically tapered on outer half, tip very slightly widened, four times as long as wide; pecten reaching to middle of tube, long; the single tooth a quadrangular scale with excavate base and roundedly furcate apex, one branch produced into a long hair; a single hair beyond middle of tube, beyond pecten. Lateral comb of eighth segment a long curved row of scales preceded by a large area of minute scales; single scale with a long thick terminal spine three times as long as the scale, with a rounded process on one side and three on the other. Anal segment longer than wide, ringed by the plate; dorsal tuft a long hair and brush on each side; a small lateral tuft; ventral brush a series of short tufts running the whole length of ventral line. Anal gills very long, three times as long as the segment, regularly tapered to a sharp tip; a wavy central trachea.

Pupa (plate 149, fig. 704).—Thoracic mass roundedly subpyriform; air-tubes moderate, broadly funnel-shaped; abdomen very stout, central segments with long terminal hairs; a small tuft at apical angles of eighth segment; anal paddles large, broadly rounded, with minute terminal seta.

Egg (plate 146, fig. 670).—Broadly fusiform, covered with regular hexagonal reticulations, each with a stout recumbent spine attached to the end towards the micropyle, half as long as the reticulation; a square gelatinous cushion at the micropyle.

The larvæ are predaceous upon other mosquito larvæ, especially *Psorophora columbiæ* and *Aëdes sylvestris*. They take no other food. The eggs are laid singly on the ground, probably in the dry hollows where water usually collects after rains. Apparently they do not hatch until the following season. They have a spinose covering, exactly like that of the eggs of the *P. columbiæ* on which they usually feed. This probably preserves them from desiccation while the puddles are dry. Immediately after a heavy shower, when the puddles are filled, the *P. ciliata* eggs and those of their prey both hatch. The *P. columbiæ* grow with surprising rapidity, and the *P. ciliata*, being initially larger, proceed to feed upon them and grow with equal rapidity. It is essential that the development should proceed as rapidly as possible, as these transient puddles often dry up in a few days. Dupree and Morgan have determined that adults develop in less than five days. Indeed, the puddles often dry so soon as to preclude the development of any adults of either the *P. ciliata* or their prey. A second rain, following the first within a week, is usually essential to secure a successful brood. The eggs do not all hatch at one time, but some of them hatch after every considerable rain. Provided there are enough of the prey, the *P. ciliata* pupate and issue as adults promptly; if by any chance their prey become entirely consumed, the *P. ciliata* linger in the puddle until it dries or they perish of starvation. Mr. Knab has observed that the larvæ are fond of hiding beneath grass or other floating vegetation. The winter is passed in the egg state. The females are rather severe biters and, owing to their large size, can puncture the skin of a man through a considerable thickness of clothing. We have no observations on

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the mating habits. It is probable that they do not swarm. The adult appears to be diurnal in habits. Males have occasionally been taken at light by night. Females have been observed sucking vegetable juices.

Eastern and central United States to Central America; eastern South America, from southern Brazil to the Argentine.

Plattsburg, New York (G. H. Hudson); Ithaca, New York, September 7, 1903 (O. A. Johannsen); Sheepshead Bay, New York, May, 1903; Lyons, New York, July, 1902 (W. F. Hubbard); Springfield, Massachusetts, September 20, 1903 (F. Knab); West Springfield, Massachusetts, August 2, 1903 (H. J. McGyll); Chicopee, Massachusetts, June 6, 1897 (F. Knab); Cambridge, Massachusetts, August 18, 1885 (G. Dimmock); Suffield, Connecticut, August 24, 1874 (G. Dimmock); Dorchester, Massachusetts (P. S. Sprague); Agawam, Massachusetts (G. Dimmock); Larchmont, New York (W. Stump); Winona Lake, Indiana (E. B. Williamson); Lake Maxinkuckee, Indiana (W. B. Evermann); Delair, New Jersey, September 27, 1900 (W. P. Seal); Toms River, New Jersey, August 6; Sea Girt, New Jersey, August 3, 1903; St. Elmo, Virginia (F. C. Pratt); Washington, District of Columbia, July 28, 1906 (H. S. Barber); Lloyds, Maryland, July 10, 1907 (H. S. Barber); Piney Point, Maryland, June 23, 1904 (T. Pergande); Baltimore, Maryland, July, 1899 (D. C. Clark); Plummer's Island, Maryland, July 26, 1905 (E. A. Schwarz, H. S. Barber); Grassymead, Virginia, June 20, 1904 (H. G. Dyar); Woodstock, Virginia, June 19, 1903 (F. C. Pratt); Del Ray, Virginia, July 5, 1903 (F. C. Pratt); Bothwell, Virginia, October 17, 1901 (E. G. William); Richmond, Virginia (E. C. Levy); Kanawha Station, West Virginia, July 20, 1907 (A. D. Hopkins); Sullivan Island, North Carolina, August 31, 1903 (W. H. Parker); McClellanville, South Carolina, October 12, 1906; Brunswick, Georgia, July 17, 1909 (G. Coester); Augusta, Georgia (C. H. Cohen); Grasmere, Florida, May 27, 1901 (C. E. Brooker); Ormond, Tampa, Kissimmee and Arcadia, Florida, April (Dyar and Caudell); Key West, Florida, August, 1901 (A. Busck); Belzona, Mississippi, August 4, 1904 (H. S. Barber); Clarksdale, Mississippi, July 31, 1904 (H. S. Barber); Natchez, Mississippi (Fleming); Agricultural College, Mississippi, July 10, 1902 (G. W. Herrick); New Orleans, Louisiana, July 30, 1900 (H. A. Veazie); Johnson's Bayou, Louisiana, July 26, 1906 (J. D. Mitchell); Deckerville, Arkansas, October 5, 1900 (W. B. Burns); Scott, Arkansas, July 14, 1908 (J. K. Thibault, Jr.); Austin, Texas, August 7, 1903 (A. W. Morrill); Victoria, Texas (E. A. Schwarz); San Diego, Texas (E. A. Schwarz); Rosser, Texas, July 6, 1905 (C. R. Jones); Galveston, Texas, September 30, 1901 (J. T. Moore); Brownsville, Texas, May 26, 1904 (H. S. Barber); Wister, Indian Territory, July 5, 1904 (H. S. Barber); Manhattan, Kansas, August 24, 1906 (R. E. Eastman); St. Louis, Missouri, July, 1904 (A. Busck); Lincoln, Nebraska, August (L. Bruner); Fremont, Nebraska, July 28, 1900; Burlington, Iowa (P. Bartch); Agricultural College, Michigan, September 8, 1896 (R. H. Pettit); Mitchell, South Dakota, October, 1902 (E. L. Fullmer); Los Angeles, California (D. W. Coquillett)*; La Oaxaqueña near Santa Lucrecia, State of Vera Cruz, Mexico, September 18, 1911 (F. W. Urich); Almoloya, State of Oaxaca, Mexico, July 19, 1905 (F. Knab); Tehuantepec, Mexico, July 3, 1905 (F. Knab); Pirauba, State of Minas Geraes, Brazil, January 10, 1908 (Instituto Oswaldo Cruz).

* This record has been published by Dr. Dyar. It depends on a single specimen from the Coquillett collection in the U. S. National Museum. There are no other records of the species from the west coast of America and we have reason to believe the record incorrect. We have learned that Mr. Coquillett's collection contained material from Illinois and California and that the specimens did not bear locality labels when presented to the Museum. They were afterwards labeled by an assistant and there is every reason to believe that an error was made in labeling this specimen.

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This species has been reported also from Honduras (Walker), State of Minas Geraes, Rio de Janeiro, and São Paulo, Brazil (Peryassú), Argentina (Arribálzaga).

The adults from Brazil and southern Mexico differ slightly in the ornamentation of the thorax, and larvæ from Mexico also differ slightly in the shape of the pecten-teeth of the air-tube. It is probable that the southern specimens represent a different race, or races, perhaps species; but our material is scanty and not of the best, so we refrain from a positive decision. It should be noted that there is a considerable interval, between southern Brazil and Honduras, in which the species apparently does not occur. If it should prove that the South American form is a distinct species, it will bear the name *Psorophora tibialis* Robineau-Desvoidy.

The synonymy is obvious, except in the case of *Psorophora boscii* Robineau-Desvoidy. This is quoted on the authority of Theobald, but with considerable misgiving. Robineau-Desvoidy indicated a general yellow coloration for his species and much smaller size than *Psorophora ciliata*. His specimen most likely was a badly denuded specimen of some species of *Aëdes*. *Psorophora centaurus* is a manuscript name of Walker's, and although published as a synonym, must be credited to Theobald who introduced it into the literature. The larvæ and pupæ of this species were first figured by Howard (1900).

PSOROPHORA SÆVA Dyar & Knab.

Psorophora cilipes Coquillett (in part, not Fabricius), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 14, 1906.
Psorophora sæva Dyar & Knab, Proc. Biol. Soc. Wash., xix, 132, 1906.
Psorophora sæva Busck, Smiths. Misc. Colls., quart. iss., lii, 62, 1908.
Psorophora cilipes Theobald (not Fabricius), Mon. Culic., v, 125, 1910.
Psorophora sæva Theobald, Mon. Culic., v, 605, 1910.

ORIGINAL DESCRIPTION OF PSOROPHORA SÆVA:

Black with blue reflection, the legs with dense, short, outstanding scales; tips of posterior femora white. Whitish scales on sides of head and a line at least on thorax, but this is denuded. Wings smoky blackish.

3 specimens, Trinidad, B. W. I. (F. W. Urich); Trinidad, June (A. Busck).

Type.—Cat. No. 9964, U. S. Nat. Mus.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF PSOROPHORA SÆVA:

Female.—Proboscis long, cylindrical, uniform, labellæ small; black, covered with slightly raised black scales with violaceous luster. Palpi about two-fifths as long as the proboscis, covered with blue-black scales and some long black bristles. Antennæ slender; tori subspherical, dark brown, with a few small setæ within; second joint nearly twice as long as succeeding joints, which are subequal, ciliate; basal whorls of few blackish hairs. Clypeus elongate, prominent, rounded before, nude, shining blackish brown. Eyes black. Occiput dark brown, broad and exposed; vestiture of somewhat broad curved white scales, most numerous along ocular margin and posteriorly, a rather narrow lighter bare area along median suture; numerous black bristles, rather longer next the eyes but not more abundant.

Prothoracic lobes moderate, elliptical, prominent, remote, very dark brown with many short black setæ. Mesonotum prominent in front, arcuate, very dark brown, largely devoid of vestiture; a narrow line of dense, narrow, curved black scales in the middle and a similar line on each side of this straight, parallel, extending to the ante-scutellar space, separated from each other by broad, bare areas; at anterior termination of lateral lines begins a line of narrow, curved white scales which bends outward at middle, terminating at roots of wings; a number of black bristles, most dense laterally and over the roots of the wings; a line of long hairs at sides of ante-scutellar space. Scutellum trilo-

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bate, middle lobe larger than the others, moderately prominent, with many well-separated blackish bristles. Postnotum prominent, rounded, brownish black, nude. Pleuræ blackish, with patches of white scales and a few black bristles; coxæ brown, each with a small patch of flat white scales at base.

Abdomen subcylindrical, tapering posteriorly, slightly flattened, very dark brown; the segments with many rather short, black, lateral and apical hairs; clothed dorsally with black scales with a brilliant violet-blue luster; first segment with a central patch of white scales and with many black setæ; sides with large, apical, segmentary subquadrate patches of flat white scales, absent on the last two segments; venter violet-black scaled, like dorsum.

Wings moderate, rather narrow, entirely smoky brownish, heaviest towards costa, veins darker; petiole of second marginal cell not quite as long as its cell, that of second posterior about equal to it; basal cross-vein about its own length distant from anterior cross-vein; scales narrow, black with a bright-blue luster, especially along costa, those along veins in two series, short appressed ones and long, narrowly lanceolate outstanding ones. Halteres with whitish stems and black knobs.

Legs long, appearing thickened by numerous erect violet-black scales; basal half of hind femora pale and clothed with flat, yellowish iridescent scales, outwardly with suberect blue-black scales; knees, broadly white scaled; tibiæ and tarsi clothed with dense violet-black erect scales, most prominent on hind legs. Claw formula, 1.1–1.1–1.1.

Length: Body about 8 mm.; wing 7 mm.

Male.—Proboscis straight, nearly uniform. Palpi very long, exceeding the proboscis by the last two joints, these latter together exceeding the long joint in length; long joint with a false articulation before middle, slightly thickened apically; last two joints somewhat thickened apically and bearing black hairs; vestiture of violet-black scales. Antennæ densely plumose; second joint long and bearing many erect scales, the succeeding segments short, brown at origin of hair-whorls, then blackish, then pale. Coloration similar to the female. Abdomen elongate, depressed, broadened to fifth and sixth segments, with brown, moderately long and abundant lateral ciliation. Wings narrower than in the female; petioles of second marginal and second posterior cells longer; cross-veins more closely approximated. Claw formula, 2.1–2.1–1.1.

Length: Body about 7.5 mm.; wing 6 mm.

Genitalia (plate 20, fig. 145): Side-pieces long, curved, three times as long as wide, tips rounded, apex and inner margin densely hairy, somewhat lobed. Clasp-filament short, stout, constricted near base, tip obliquely tapering, a small terminal claw. Harpes elliptical, concave, inner margin revolute, tip thickened, with small teeth projecting laterally. Harpagones with a long slender stem, expanded at tip and bearing a row of coarse setæ and a slender filament. Unci forming a basal cylinder, margins revolute, inner edges dentate.

Larva, Stage IV (plate 114, fig. 386).—Head subquadrate, wider than long, posterior angles rounded; eyes on an irregular prominence; antennæ inserted laterally on an angled prominence, front margin shallowly emarginate. Antennæ cylindrical, nearly uniform, sparsely spined all over, but most prominently along outer side, a single hair at outer fourth; four articulated terminal processes and a long spine. Eyes large, divided, the larger anterior part pointed. Both pairs of dorsal head-hairs single; ante-antennal hairs single. Mouth-brushes inserted on outer angles of head, folded downward and backward, of numerous coarse setæ which are finely transversely pectinate. Mental plate triangular, with a central tooth and about eight on each side, the penultimate one longer. Mandible quadrangular, slightly convex without, a single appendage near tip; an outer row of few coarse setæ; dentition of two large teeth with

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serrations on inner side. Maxilla rounded rectangular, the attachment oblique, the short palpus sessile on the outer angle; a fringe of short spines on inner aspect, those on projecting inner angle longest; a small spine before tip. Palpus hardly longer than broad, truncate at tip; with four rudimentary digits. Thorax rounded, about as wide as long, the anterior margin strongly convex; lateral single hairs long, tufts short. Abdomen stout, segments transverse, anterior ones strongly projecting laterally; long lateral hairs double to fifth segment, single on sixth; secondary hairs in small tufts. Tracheal tubes broad, band-shaped, nearly even. Air-tube long, nearly evenly tapered from near base, over five times as long as wide; pecten not reaching to middle of tube, of about 17 teeth, the single tooth a roundedly quadrangular scale with two to four apical spines, one of which is prolonged into a hair, four times as long as the scale; a small hair-tuft beyond the middle of the tube, well beyond pecten. Lateral comb of eighth segment a row of about 14 scales in a straight line on a chitinized infuscated band, preceded by a large patch of little fan-shaped scales many rows deep; single scale with a trifid apex, the middle tooth lengthily produced. Anal segment longer than wide, ringed by the plate; dorsal tuft a long hair and brush on each side; a small lateral tuft; ventral brush a series of short tufts running the whole length of ventral line. Anal gills very long, three times as long as the segment, regularly tapered to a sharp tip.

Doubtless the life history and habits are similar to the other species of the subgenus. The larvæ occur in transient puddles after rains and prey upon other mosquito larvæ. Mr. Busck found them, together with those of *Psorophora cilipes,* in a newly flooded meadow preying upon the larvæ of *Culex corniger* and of *Psorophora posticata.*

Southern Mexico to northern South America.

Trinidad, British West Indies (F. W. Urich; A. Busck); Las Cascadas, Canal Zone, Panama, May 15, June 18, 1907 (A. Busck); Tabernilla, Canal Zone, Panama, August 30, 1908 (A. H. Jennings); Pedro Miguel, Canal Zone, Panama (A. H. Jennings); Santa Rosa, Vera Cruz, Mexico, August, 1906 (W. Schaus).

Psorophora sæva greatly resembles *Psorophora cilipes* in general appearance and may be easily confused with it. In *sæva* the outstanding scales of the legs are rather narrow and dark violet, while in *cilipes* they are much broader, clavate and spatulate, more irregularly disposed and strongly iridescent. Other differences are indicated in the descriptions. The scales on the mesonotum are very dehiscent and captured specimens are usually entirely denuded; in such the mesonotum presents a highly polished, nearly unbroken surface.

PSOROPHORA CILIPES (Fabricius) Dyar & Knab.

Culex cilipes Fabricius, Syst. Antliat., 34, 1805.
Sabethes scintillans Walker, Cat. Brit. Mus., Dipt., i, 1, 1848.
Sabethes scintillans Giles, Gnats or Mosq., 185, 1900.
Psorophora scintillans Theobald, Mon. Culic., i, 265, 1901.
Psorophora scintillans Giles, Gnats or Mosq., 2 ed., 346, 1902.
Psorophora scintillans Theobald, Mon. Culic., iii, 130, 1903.
Psorophora scintillans Lutz in Bourroul, Mosq. do Brasil, 71, 1904.
Psorophora scintillans Blanchard, Les Moust., 241, 1905.
Psorophora cilipes Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 179, 1906.
Psorophora cilipes Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 14, 1906.
Psorophora iracunda Dyar & Knab, Proc. Biol. Soc. Wash., xix, 133, 1906.
Psorophora scintillans Aiken, Brit. Guiana Med. Annual, 1906, 65, 1907.
Psorophora scintillans Peryassú, Os Culic. do Brazil, 44, 159, 1908.
Psorophora iracunda Busck, Smiths. Misc. Colls., quart. iss., iii, 62, 1908.
Psorophora scintillans Theobald (in part), Mon. Culic., v, 124, 1910.
Psorophora iracunda Theobald, Mon. Culic., v, 605, 1910.

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ORIGINAL DESCRIPTION OF CULEX CILIPES:

cilipes. ♂. C. fuscus abdomine pallido, palpis haustello longioribus hirtis.
Habitat in America meridionali Dom. Smidt. Mus. Dom. de Schestedt.
Paullo major C. pipiente. Caput flavescens, antennis longitudine haustelli utrinque valde pectinatis. Palpi quadriarticulati, hirti, haustello longiores. Thorax gibbus, fuscus, immaculatus. Abdomen cylindricum, pallidum. Pedes elongati.

ORIGINAL DESCRIPTION OF SABETHES SCINTILLANS:

Mas. *Nigra, iridescens, argenteo micans, antennis subalbis, pedibus pilosis, alis subfuscis.*

Body black, hairy, with iridescent and silvery reflections: feelers about half the length of the body, dull white, adorned with whorls of long dark reddish-brown hairs, and clothed towards their tips with short down: palpi nearly as long as the body, brown; the two last joints black and hairy: a large silvery spot on each side of the chest: mouth as long as the feelers: legs very thickly clothed with hairs, excepting the fore-legs and the shanks and feet of the middle legs, where the hairs are short and more thin: wings slightly tinged with brown, fringed; veins brown; poisers dull red, with black tips. Length of the body 3 lines; of the wings 6 lines.

♂. Para. Presented by Mrs. J. P. G. Smith.

ORIGINAL DESCRIPTION OF PSOROPHORA IRACUNDA:

Black with metallic blue luster, the legs with abundant outstanding scales, long and squammose. Posterior femora slightly grayish at tip. Wings smoky clouded.

5 specimens, Puntarenas, Costa Rica (F. Knab).

Type.—Cat. No. 9965, U. S. Nat. Mus.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF PSOROPHORA CILIPES:

Female.—Proboscis subcylindrical, moderate, uniform, the labellæ conically tapered; vestiture of black scales with metallic blue and iridescent luster, roughened ventrally especially towards the base. Palpi over two-fifths as long as the proboscis, clothed with black scales which have a dark-blue reflection in certain lights and a few iridescent and metallic blue scales intermixed; setæ rather numerous, a few of those towards base longer than those on proboscis. Antennæ slender; tori subspherical, dark brown, with a few minute setæ within, succeeding joints blackish, pilose; hairs of whorls sparse, black. Clypeus prominent, subglobose, truncate at base, excavate on either side of middle, tip rounded, nude, shining blackish. Eyes black. Occiput broad and exposed, blackish, sparsely covered with broad, white curved scales and numerous rather short black bristles, which are somewhat more numerous at vertex but nearly evenly distributed over occiput.

Prothoracic lobes moderate, blackish brown, with many black setæ. Mesonotum prominent in front, arcuate, shining, black; a narrow, median, longitudinal line extending to ante-scutellar space densely clothed with small black scales and small brown-tipped setæ; on either side of this a broad convex bare space showing the shining, nearly black integument, a narrow straight line of small black scales defining outer edge of bare stripes; lateral area, except on front angles, entirely covered, although sparsely, with broad, curved pearly-white scales; ante-scutellar space surrounded by white scales; a broad bare stripe on each side of ante-scutellar space; laterally a number of brown-tipped setæ which become very numerous at roots of wings. Scutellum trilobate, blackish, with white scales, each lobe with a large group of black hairs, middle lobe with about thirty. Postnotum elliptical, convex, prominent, nude, dark brown. Pleuræ and coxæ blackish brown, with numerous short bristles and covered rather densely with flat white scales.

Abdomen subcylindrical, somewhat flattened, last segments tapering; clothed dorsally with black scales with bright metallic-blue luster; rather numerous bristles apically and laterally; a series of large lateral patches of white scales on posterior edges of segments; first segment with metallic blue scales and many

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black setæ on the disk; venter brownish black, setose, with scale vestiture similar to dorsum but more scant.

Wings rather narrow, entirely smoky brown, darkest on the costa; petiole of second marginal cell nearly as long as its cell, that of second posterior cell longer; basal cross-vein distant less than its own length from anterior cross-vein; wing-scales blackish with a dark-blue metallic luster, the outstanding ones long and narrowly lanceolate.

Legs long, appearing stout on account of the dense erect vestiture; rather uniformly clothed with broad, erect, blue-black scales with metallic violet and brilliant iridescent luster, except the last three joints of tarsi which have the scales but slightly raised, blue black; tips of middle and hind femora with small patch of grayish-white scales; outstanding scales subtruncate, partly sessile and partly with long slender stalk, giving a characteristic shaggy appearance. Claw formula, 1.1–1.1–1.1.

Length: Body about 7 mm.; wing 6.5 mm.

Male.—Proboscis straight, slender, metallic-blue scaled. Palpi exceeding the proboscis by the length of the last two joints; last two joints thickened, together about three-fourths the length of the long joint; long joint with a median false articulation; vestiture of black scales mixed with blue metallic ones and very numerous long black setæ at outer third of long joint and on the two apical ones. Antennæ densely plumose; last two joints long and slender, the others short, pale, black-ringed at origins of the hair-whorls; second joint short, with a number of long black scales. Coloration similar to the female. Abdomen long, depressed, broadened to fifth and sixth segments, with abundant, fine, black lateral ciliation; dorsal scales with a bright blue luster. Wings narrower than in the female, stalks of fork-cells longer, vestiture less abundant. Legs densely clothed with erect scales practically throughout. Claw formula, 2.1–2.1–1.1.

Length: Body about 9 mm.; wing 6.5 mm.

Genitalia (plate 20, fig. 144): Side-pieces long, over twice as long as wide, tips rounded. Clasp-filament long, nearly uniform, slightly curved, tip angularly truncate; a stout terminal claw; a row of setæ along inner margin. Harpes thickened, concave, inner margin thickened and revolute, tip with a point directed outward. Harpagones with a long, slender stem, tip enlarged, bearing many setæ and a large leaf-like appendage with curved pointed tip. Unci forming a double basal cylinder, revolute, inner margins dentate.

Larva, Stage IV (plate 114, fig. 389).—Head subquadrate, wider than long, posterior angles rounded; eyes prominent; antennæ inserted before middle of side; front slightly emarginate. Antennæ cylindrical, slightly tapered, with coarse tooth-like spines on one side of basal two-thirds; a spine-like hair at outer third; a long hair, three spines and a digit at tip. Eyes large, pointed. Inner pair of dorsal head-hairs single, outer pair small tufts. Mouth-brushes inserted on outer angles of head, folded downward and backward. Mental plate triangular, with a central tooth and nine on each side, the last one prominent. Mandible quadrangular, tapering and pointed at base; a patch of small spinules on outer aspect; a filament before tip; an outer row of short filamentous cilia; outer margin with small notches; dentition of two sets of teeth strongly projecting, the first a long tooth, concave below, its lower side with three sharp incisions; second tooth similar but smaller, lower side with five incisions; a flat irregular dentition below; basal angle roundedly prominent, with four long hairs within; a row of long hairs at base. Maxilla irregularly conical, obliquely produced inward, divided by a bent suture; inner portion with a few spines and a pair of short filaments; a tuft of coarse spines at tip; outer half with short coarse spines along outer margin and at bend in suture; a pair of short clear

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processes near tip. Palpus broadly attached, not more than half as long as maxilla; terminal digits minute. Thorax rounded, about as wide as long; hairs slight. Abdomen stout, segments transverse; lateral hairs multiple on first two segments, triple on third, single on fourth to sixth. Tracheal tubes broad, band-shaped. Air-tube stout, conically tapered outwardly, over three times as long as wide; pecten reaching to outer fifth of tube, beginning basally before chitinized part; single tooth a quadrangular scale with excavate base and trifid apex, one branch produced into a long hair; a long hair-tuft almost at apex of tube, well beyond pecten. Lateral comb of eighth segment, a long, curved row of scales preceded by a large area of minute scales; single scale elliptical with five stout apical spines, the central one twice as long as subapical one. Anal segment longer than wide, ringed by the plate; dorsal tuft a long hair and brush on each side; a single lateral hair; ventral brush a series of tufts running the whole length of ventral line, puncturing the chitinized ring. Anal gills very long, longer than the segment, regularly tapered to a sharp tip.

Mr. Knab found the larvæ in a large pond choked by vegetation in the forest beyond the settlement. The pond contained numerous other mosquito larvæ, species of *Aëdes* and *Janthinosoma,* on which the *Psorophora cilipes* were feeding. This was the only place where this species occurred. Temporary pools in the vicinity contained *Psorophora virescens,* but not this species. The living larva is darker in color than that of *P. virescens.* Mr. Busck found the larvæ in numbers " in a newly flooded meadow covered with bushes and tall grass. They were preying upon the larvæ of *Culex lactator* [=*corniger* Theob.] and *Janthinosoma posticata,* which were very abundant in these temporary pools."

Tropical America; São Paulo, Brazil, to Costa Rica.

Las Loras, near Puntarenas, Costa Rica, September, 1905 (F. Knab); Las Cascadas, Canal Zone, Panama, May 15, 1907 (A. Busck); Tabernilla, Canal Zone, Panama, August 24, 30, 1908 (A. H. Jennings); Gatun, Canal Zone, Panama (A. H. Jennings); Siparuni Creek, Essequibo River, British Guiana (K. S. Wise); City of Pará, Brazil (C. F. Baker). The species has been reported also from Trinidad (Theobald); São Paulo, city of Rio de Janeiro, Juiz de Fora in Minas Geraes, Brazil (Peryassú).

Psorophora cilipes is related to *P. sæva;* Mr. Coquillett included both under the determination " *Psorophora cilipes* Fab." The adults of *P. cilipes* are easily recognized by the iridescent, strongly outstanding, nearly erect scales of the legs; these scales are broad, truncate and of different shapes and lengths, some with long slender stalks, which gives the legs a characteristic shaggy appearance. The larvæ also differ to a marked degree. Our identification is based on the comparison of specimens with the type of Fabricius, in the Zoological Museum at Copenhagen, by Dr. Arthur Neiva.

PSOROPHORA VIRESCENS Dyar & Knab.

Psorophora scintillans Parker, Beyer & Pothier (not Walker), Bull. 13, Yell. Fever Inst., U. S. Publ. Health & Marine-Hosp. Serv., 41, 1903.

Psorophora howardii Dyar & Knab (in part, not Coquillett), Journ. N. Y. Ent. Soc., xiv, 180, 1906.

Psorophora virescens Dyar & Knab, Proc. Biol. Soc. Wash., xix, 133, 1906.

Psorophora howardii Coquillett (in part, not Coquillett), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 14, 1906.

Psorophora virescens Theobald, Mon. Culic., v, 605, 1910.

ORIGINAL DESCRIPTION OF PSOROPHORA VIRESCENS:

Close to *P. howardii* Coquillett, but the abdomen above metallic green shining instead of blue. The species is also somewhat smaller.

35 specimens, Almoloya, Acapulco, Tehuantepec, Salina Cruz, Mexico; Puntarenas, Costa Rica (F. Knab); Manzanillo, Mexico (A. Dugès); Monterey, Mexico (J. Goldberger).

Type.—Cat. No. 9966, U. S. Nat. Mus.

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DESCRIPTION OF FEMALE, MALE, AND LARVA OF PSOROPHORA VIRESCENS:

Female.—Proboscis slender, about as long as abdomen, uniform, labellæ small and tapered; uniformly covered with black scales and numerous small bristles. Palpi over one-third as long as the proboscis and similarly clothed; bristles, especially toward base, longer. Antennæ slender; shaft ciliate; tori subspherical, dark brown; hairs of whorls sparse, short, black. Eyes bronzy black. Occiput blackish brown, with a narrow bare line along median suture, rather densely clothed with broad, white curved scales and with rather numerous short blackish-brown bristles. Clypeus elongate, prominent, rounded, convex, tip subtruncate, shining, brown, nude.

Prothoracic lobes prominent, moderate, remote, yellowish, with many short black setæ. Mesonotum fairly prominent before, arcuate, blackish brown medianly, lighter brown at the sides; a narrow, median longitudinal line, terminating before ante-scutellar space, clothed principally with small black scales and a double series of short pale-brownish bristles; on either side of this a broad bare stripe showing the shining blackish integument; bordering the bare stripe outwardly a narrow line of dark scales and bristles similar to median line and extending from anterior third of mesonotum to base; anterior angles devoid of scales; immediately within this bare area is a broad, anteriorly pointed, band of broad white scales reaching to roots of wings; a large basal median patch of white scales involving ante-scutellar area, a broad bare stripe on each side of it; hairs at sides of disk coarse, black. Scutellum trilobate, dark brown, each lobe with numerous black setæ and a few white scales behind, most abundant on mid lobe. Postnotum elliptical, nude, blackish, slightly pruinose. Pleuræ blackish, yellowish in front, largely covered with elliptical, flat white scales mixed with short pale setæ. Coxæ yellowish, with a line of black setæ, each with a large patch of white scales at base, on the anterior pair followed by a few black scales with blue luster.

Abdomen subcylindrical, flattened, posterior segments tapered; clothed dorsally with black scales which have a bright greenish-blue reflection; the last two segments paler with silvery and coppery iridescence; a row of lateral segmentary white stripes, joined into continuous lateral bands, widening somewhat at bases and apices of the segments; first segment clothed dorsally with white scales and with many brown hairs; venter clothed with pale brown and white scales intermixed, a median basal spot of black scales on each segment.

Wings rather narrow, smoky, somewhat darker on costal half; petiole of second marginal cell shorter than its cell, that of second posterior cell about equal to its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales of veins small, brownish black, the outstanding ones on the veins long and narrow. Halteres with pale stems and blackish knobs.

Legs long, slender, nearly completely devoid of outstanding scales; femora ochraceous, clothed with short appressed shining yellowish scales, a broad apical ring of raised black scales with a violet-blue luster; tibiæ clothed with black scales with violet-blue luster, raised on distal portion, a line of bluish silvery scales at base beneath; no white knee-spots; vestiture of the tarsi of appressed scales, black with a faint blue luster, slightly raised on the hind tarsi and with white spots at bases of first and second joints. Claw formula, 1.1–1.1–1.1.

Length: Body about 7.5 mm.; wing 6 mm.

Male.—Proboscis slender, uniform, straight, black. Palpi exceeding the proboscis by a little more than the length of the last joint only; last two joints about equal, thickened; long joint with a bare false articulation before the middle; vestiture black with a blue luster and numerous long setæ at end of long joint and on the two terminal ones. Antennæ plumose; last two joints long, setose, the others short, whitish, with thick, black rings at origins of whorls; hairs of

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whorls long, dense; second joint with many erect black scales. Coloration similar to the female. Abdomen elongate, depressed, with black lateral ciliation, the dorsal vestiture metallic blue throughout. Wings narrower than in the female, less strongly infuscated, the stems of the fork-cells longer. Claw formula, 2.1–2.1–1.1.

Length: Body about 5.5 mm.; wing 4.7 mm.

Genitalia (plate 20, fig. 141): Side-pieces conical, about twice as long as wide, without basal or apical lobes; clasp-filament large, inflated, distorted, bifurcate, inner fork projecting inwards at a right angle, thick, rounded, its terminal third again bent inward at a right angle, outer fork parallel to inner, more slender, shorter, not bent at tip, with a small inserted terminal spine. Basal portion of clasp densely setose. Harpes erect, columnar, concave, tips bent over sharply and terminating in several small teeth. Harpagones large, slender at base, expanding outwardly, the tip widened into a large round circular head densely covered with very numerous short setæ. Unci approximate, tips conical, separated, lateral margins revolute with an angular projection towards summit. Basal lobes not developed.

Larva, Stage IV (plate 114, fig. 387).—Head subquadrate, wider than long, posterior angles rounded; eyes on an irregular prominence; antennæ inserted laterally on an angled prominence; front margin shallowly emarginate. Antennæ cylindrical, nearly uniform, sparsely spined all over, a single hair at outer fourth, articulated terminal processes and a long spine, three times as long as processes. Eyes large, divided, the larger anterior part pointed. Upper pair of dorsal head-hairs single, lower double; ante-antennal hair double. Mouth-brushes inserted on outer angles of head, folded downward and backward. Mental plate triangular, with a large central tooth and eight on each side, penultimate one large and projecting. Mandible quadrangular, convex without, smooth, a single appendage near tip; an outer row of few coarse filamentous setæ; dentition of two long teeth, the first very long and curved, bearing three small but wide teeth on its inner aspect, the second shorter, with five small teeth on its inner edge; a group of three little teeth below; a small projection at angle; a row of fine setæ near base. Maxilla rectangular, palpus projecting well beyond outer angle, a row of short spines on outer margin. Palpus twice as long as broad, tapering a little to a truncate tip, the terminal digits rudimentary. Thorax rounded, about as wide as long, anterior margin strongly convex; lateral single hairs long, tufts short. Abdomen stout, segments transverse, anterior ones strongly projecting laterally; lateral hairs multiple on basal segments, double on fifth, single on sixth; secondary hairs in small tufts. Tracheal tubes large, band-shaped, scarcely enlarged in thorax. Air-tube stout, conically tapered from near base, tip less tapered, four times as long as wide; pecten reaching to middle of tube, long; single tooth a quadrangular scale with excavated base and roundedly furcate apex, one branch produced into a long hair; a single hair beyond middle of tube and beyond pecten. Lateral comb of eighth segment a long curved row of scales preceded by an area of minute scales; single scale with three terminal spines, the middle one of which is lengthily produced; small teeth mostly narrow and elongate, terminated in a row of cilia. Anal segment longer than wide, ringed by the plate; dorsal tuft a long hair and brush on each side; a double lateral hair; ventral brush a series of short tufts running the whole length of ventral line. Anal gills very long, twice as long as the segment, regularly tapered to a sharp tip.

Mr. Knab found these larvæ in a small ditch of muddy water with larvæ of *Psorophora discolor,* in puddles of muddy water in a dry stream-bed with *Psorophora toltecum,* in a large muddy puddle in the bed of a stream with *Culex* larvæ, in a ditch of nearly stagnant water in a town without other larvæ

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(fed with larvæ of *Aëdes calopus* and *Culex*) and in pools and muddy hoof-tracks at the head of a mangrove-lined inlet. It is obviously a temporary puddle species with the general habits of the genus.

Mexico and Central America.

Almoloya, State of Oaxaca, Mexico, July 19, 1905 (F. Knab); Acapulco, Mexico, July 28, 1905 (F. Knab); Tehuantepec, Mexico, July 3, 1905 (F. Knab); Salina Cruz, Mexico, July 11, 1905 (F. Knab); Manzanillo, Mexico, (A. Dugès); Monterey, Mexico (J. Goldberger); Island of Maria Madre, Mexico (A. Dugès); Puntarenas, Costa Rica, September 8, 1905 (F. Knab).

Psorophora virescens is closely allied to *P. howardii*, and was so determined by Mr. Coquillett. It is however, distinct. The characters, though small, are constant in both adults and larvæ.

PSOROPHORA HOWARDII Coquillett.

Psorophora howardii Coquillett, Can. Ent., xxxiii, 258, 1901.
Psorophora howardii Dupree & Morgan, Science, n. s., xvi, 1037, 1902.
Psorophora howardii Morgan & Dupree, U. S. Dept. Agr., Div. Ent., Bull. 40, n. s., 91, 1902.
Psorophora howardii Taylor, Revista de Med. Trop., iv, 148, 157, 166, 172, 1903.
Psorophora howardii Theobald, Mon. Culic., iii, 131, 1903.
Psorophora howardii Johannsen, Bull. 68, N. Y. State Mus., 410, 1903.
Psorophora howardii Pazos, Bull. Soc. Ent. Fr., 1904, 134, 1904.
Psorophora howardi Blanchard, Les Moust., 242, 1905.
Psorophora howardii Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xiv, 180, 1906.
Psorophora howardii Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 14, 1906.
Psorophora howardii Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 1, 1906.
Psorophora howardii Theobald, Mon. Culic., iv, 162, 1907.
Psorophora howardii Pazos, San. y Benef., ii, 46, 187, 1909.
Psorophora howardii Thibault, Proc. Ent. Soc. Wash., xii, 21, 1910.
Psorophora scintillans Theobald (in part, not Walker), Mon. Culic., v, 124, 1910.
Psorophora howardii Theobald, Mon. Culic., v, 124, 1910.
Psorophora ciliipes Theobald (not Fabricius), Mon. Culic., v, 124, 125, 1910.

ORIGINAL DESCRIPTION OF PSOROPHORA HOWARDII:

Male.—Head black, upper half of occiput covered with appressed white scales, except a narrow median stripe, hairs black; first joint of antennæ yellow, second joint black, its extreme base yellow, the two terminal joints black, remainder of antennæ alternate black and whitish, the plumosity black changing to whitish at the tips; mouth-parts black, base of third joint of palpi yellow, palpi covered with violet-purple appressed scales, the last joint narrower than the preceding, tapering to the apex, its hairs sparse and very short, the penultimate joint and apical fifth of the preceding bearing many rather long hairs; body black, the humeri yellow, pleura and sides of mesonotum bearing many appressed white scales, abdomen on upper side covered with appressed violet-purple scales, those on the first segment and a few at the hind angles of some of the other segments white; wings hyaline, first basal cell much longer than the second, petiole of first submarginal cell subequal in length to the cell; femora yellow, the apices black and on the under side fringed with rather long, narrow, nearly erect scales, remainder of femora thinly covered with appressed violaceous scales; front and middle tibiæ yellow, their apices brown, thinly covered with appressed violaceous scales, hind tibiæ brown, the extreme bases yellow, covered with appressed violet-purple scales interspersed with many suberect brown ones; tarsi brown, the first joint, except its apex, and the base of the second yellow; claws of front and middle tarsi very unequal in size, the anterior claw of each pair bearing two teeth, the other with a single tooth, claws of hind tarsi of an equal size, each one-toothed; halteres yellow, becoming brown at the apex.

Female.—Differs from the male as follows: Antennæ dark brown, the first joint and base of the second yellow, the hairs dark brown, palpi dark brown, the basal third yellow, bearing a few rather long hairs; hind tibiæ yellow, the apices brown, tarsal claws equal, each one-toothed.

Length, excluding the proboscis, 6 mm. Three males and one female, received from Dr. W. C. Coker, of the Johns Hopkins University. Type No. 5793, U. S. National Museum.

Habitat.—Hartsville, South Carolina.

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This fine species is respectfully dedicated to Dr. L. O. Howard, whose investigations have so much increased our knowledge of the early stages and distribution of the members of this important family.

Description of Female, Male, Larva, and Egg of Psorophora howardii:

Female.—Proboscis slender, uniform, labellæ small, tapered; clothed with small blue-black scales and numerous small black curved setæ. Palpi half as long as proboscis, clothed with small blue-black scales, densely setose, some of the basal ones long. Antennæ slender; joints subequal, second joint somewhat longer, all pilose; tori subspherical, pale brown, a few small setæ within; hairs of whorls sparse, not long. Clypeus elongate, prominent, shortly rounded, lateral basal angles prominent, nude, brown, blackish centrally. Eyes black. Occiput broad and exposed, sordid blackish, vestiture of rather dense, broad, curved white scales and numerous short brownish setæ; a rather broad bare stripe along median suture.

Prothoracic lobes moderate, well separated, ocher yellow, with many short brownish setæ which form a dense cluster at apex. Mesonotum convex, prominent in front, brown and black, shining; a median longitudinal line of small blackish scales mixed with brownish-tipped bristles extending to ante-scutellar space; on each side of it a broad bare stripe; bordering this outwardly another row of scales and hairs similar to median one, interrupted anteriorly and extending close to base of mesonotum; anterior angles broadly nude except for a few small bristles; above this nude area is a broad patch of broad white scales, pointed anteriorly and extending obliquely backward to root of wing; white scales about ante-scutellar space and across its middle; a broad bare stripe on each side of ante-scutellar space. Scutellum trilobate, with a few white scales, more especially on mid lobe, each lobe bearing many black bristles. Postnotum elliptical, nude, dark brown. Pleuræ brown and shining black, rather densely clothed with elliptical white scales; coxæ yellowish, with many dark bristles, a patch of small bluish scales on anterior pair.

Abdomen subcylindrical, flattened, posterior segments tapered; dorsally clothed with dark scales which have a bright violet-blue luster without any green tint, except on last two segments, which are greenish and coppery iridescent; laterally a number of flat white scales which tend to form lateral lines and basal and apical segmental patches; first segment dorsally white scaled, with many pale hairs; venter largely white scaled, a series of medio-basal bright-blue spots, sixth segment largely blue-black scaled, seventh segment with iridescent scales; setæ dense, short, most numerous along the sides and posterior edges of segments.

Wings rather narrow, entirely smoky, somewhat darker on costal region; veins dark; stem of second marginal cell considerably shorter than its cell, that of second posterior cell about equal to its cell; basal cross-vein much less than its own length distant from anterior cross-vein; scales black with a bright blue reflection, outstanding scales towards apex of wing long and rather broadly lanceolate. Halteres with pale stems and blackish knobs.

Legs long, rather slender; integument of femora and tibiæ yellowish; femora clothed with small, appressed yellow shining scales, a broad apical ring of dense, black, strongly outstanding scales; tibiæ clothed with semi-erect smoky scales with metallic blue reflections, a broad apical ring of dense, outstanding black scales with blue and iridescent reflections, a line of pale iridescent scales to near apices; tarsi of all the legs with very slightly raised blackish vestiture and silvery-white rings at bases of first and second joints. Claw formula, 1.1–1.1–1.1.

Length: Body about 9 mm.; wing 6 mm.

Male.—Proboscis straight, rather short, uniform, blackish scaled. Palpi exceeding the proboscis by almost the length of the last two joints, which are

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thickened; long joint with a slight constriction resembling an articulation before the middle; vestiture of black scales with metallic blue luster; end of long joint and last two joints with numerous long black setæ. Antennæ plumose; last two joints long, pilose, the others short, slender, whitish, blackish at origins of hair-whorls; tori subglobose, hollowed at tip, dark brown; second joint with many black erect scales; hairs of whorls long, blackish. Coloration similar to the female. Abdomen elongate, strongly depressed, broadened to fifth segment, with coarse black lateral ciliation. Wings narrower than in the female, stems of fork-cells longer, vestiture less abundant, membrane less infuscated. Legs with raised scales less pronounced, the rings on tarsi smaller. Claw formula, 2.1–2.1–1.1.

Length: Body about 7.5 mm.; wing 5 mm.

Genitalia (plate 20, fig. 142): Side-pieces about twice as long as wide, tips rounded, without basal or apical lobes. Clasp-filament greatly enlarged, inflated, densely covered with setæ, a large subbasal projection bent in at right angles at apex, roundedly inflated; apical portion of clasp slender, bent inward at right angles, with a small inserted terminal spine. Harpes rather broad, concave, rounded at tip, inner margins revolute with a number of small indentations and several triangular teeth at apex. Harpagones with a long, rather thick and large round capitate apex covered with many short, stout setæ. Unci approximate, subconfluent, margins revolute, subdenticulate towards apex, a few fine setæ representing basal lobes.

Larva, Stage IV (plate 114, fig. 388).—Head subquadrate, wider than long, posterior angles rounded; eyes on an irregular prominence; antennæ inserted laterally on an angled prominence; front margin shallowly emarginate. Antennæ cylindrical, nearly uniform, sparsely spined all over, a single hair at outer fourth; four articulated terminal processes and a long spine, twice as long as processes. Eyes large, divided, the larger anterior part pointed. Both pairs of dorsal head-hairs single, approximate; ante-antennal tuft triple. Mouth-brushes inserted on outer angles of head, folded downward and backward. Mental plate triangular, with a large central tooth and eight on each side, penultimate one very large and projecting, last one small, the rest subequal. Mandible quadrangular, convex without, smooth, a single appendage near tip; an outer row of few coarse filamentous setæ; dentition of eight teeth, first and fifth long, especially the first, which is projecting and sharp, the others diminishing successively; four oblique tooth-like projections below; a small projection at angle; a row of small setæ near base. Maxilla rounded rectangular, attachment oblique, the short palpus sessile on outer angle; various short spines and setæ on inner aspect. Palpus hardly longer than broad, with four rudimentary digits. Thorax rounded, about as wide as long, anterior margin strongly convex; lateral single hairs long, tufts short. Abdomen stout, segments transverse, anterior ones strongly projecting laterally; long lateral hairs double to fifth segment, single on sixth; secondary hairs in small tufts. Tracheal tubes broad, band-shaped, nearly even. Air-tube stout, about four times as long as wide, conically tapered from near base, tip hardly widened; pecten reaching to middle of tube, long; single tooth a quadrangular scale with excavate base and roundedly furcate apex, one branch produced into a long hair; a single hair beyond middle of tube and beyond pecten. Lateral comb of eighth segment a long curved row of scales preceded by a large area of minute scales; single scale with a long terminal broad spine, twice as long as the body of the scale, one or two rounded teeth on one side, one to five on the other; small scales short and broad, terminated in a row of cilia. Anal segment longer than wide, ringed by the plate; dorsal tuft a long hair and brush on each side; a single lateral hair; ventral brush a series of short tufts running whole length of ventral line. Anal gills very long,

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about twice as long as the segment, regularly tapered to a sharp tip, each with a wavy central trachea.

Egg (plate 146, fig. 671).—Rather broadly fusiform, covered with regular hexagonal reticulations, each with a stout spine from micropylar end, half as long as the reticulation; a square gelatinous cushion at micropyle.

The larvæ live in temporary puddles and feed upon the larvæ of the non-predaceous *Psorophora* (*Janthinosoma*) and *Aëdes* that accompany them. Dupree and Morgan state that larvæ could always be found a few hours after a heavy rain. Development is rapid and they observed pupation on the fourth day of larval life. Dr. Dyar found them mixed with *Psorophora ciliata* in some cattle tracks in the bottom of a nearly dried marsh at Tampa, Florida. The water was almost gone and the larvæ had become extremely concentrated. The eggs are undoubtedly laid on the ground and the dry season is passed in this stage. We have, however, no direct observations on these and other points in the life history. Mr. Taylor, in Cuba, writes:

"We have collected the larvæ in various months of the year, but only after a very heavy rain, with a strong North wind. [The species] breeds in natural collections of still water, preferably of medium depth, with or without vegetation. We usually collected them in pools that for at least a month previously had been dried up. Always found other Culex larvæ in conjunction with them, principally C. [*Psorophora*] jamaicensis and C. confirmatus [*Aëdes scapularis*]. [The eggs] are quite large; black; oval in shape, both ends comparatively blunt, one of them being truncated; both sides even and convex, the borders being lined with short white spicules. They are laid singly on the surface of the water, each mosquito depositing from 50 to 75 eggs. They are white when first laid, but soon blacken with the action of the air. [The larvæ] are very carnivorous and cannibalistic, eating larvæ of other species of mosquitos ravenously, also eat small tadpoles. [The adult] bites readily every two days, sometimes every day. The bite is not painful, and nothing is noticed at the time, but often after 24 hours, indurated areas occur, which may persist several days. Under natural conditions we found the cycle of development to be more rapid than any other Cuban mosquito. Eggs deposited during the night of Feb. 23rd produced mosquitos on the morning of March 2nd, making a minimum cycle from egg to mosquito of 6 days for males, and 6½ days for females, under natural conditions." We think that the eggs are not normally laid upon the water, as stated by Mr. Taylor. The observations of Dupree and Morgan, and of others, show that the eggs are already upon the ground before the rain-puddles form.

Southern Atlantic and Gulf States; Cuba.

Washington, District of Columbia, August 3, 1905 (T. Pergande); Piney Point, Maryland, June 23, 1904 (T. Pergande); Hartsville, South Carolina, July 23, 1901 (W. C. Coker); Natchez, Mississippi (Fleming); Belzona, Mississippi, July 4, 1904 (H. S. Barber); Scott, Arkansas (J. K. Thibault, Jr.); New Orleans, Louisiana (J. W. Dupree); Tampa, Florida, March 18, 1905 (H. G. Dyar); Havana, Cuba (J. R. Taylor); Havana, Cuba (C. F. Baker); San Antonio de los Baños, Cuba (J. H. Pazos).

Subgenus JANTHINOSOMA Lynch Arribálzaga.

This group comprises two sections, one, *Janthinosoma* proper, with toothed claws in the female, the other, to which the name *Grabhamia* properly applies, with simple claws in the female. In *Janthinosoma*, the male genitalia have the harpagones more strongly developed, more like *Psorophora*, than in *Grabhamia*, although the division is not exact, since *cyanescens* has toothed claws in the female, but the simpler type of genitalia in the male. In the larvæ there is no

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difference whatever between the two groups of this subgenus. The difference in the armature of the claws in the adult female represents only a degree of development, correlated with the method of copulation. It is without special significance, and does not warrant the division of the group.

Janthinosoma has been recognized on the fringing scales of the hind legs. This character, while distinct in a number of species is gradually evanescent in others, until there are found some, clearly belonging to the group on larval and other characters, but devoid of these scales. The group is a distinct one on larval characters, all the species having the same peculiar lateral comb of the eighth abdominal segment. These larvæ (with one exception) have a strongly inflated air-tube. The male genitalia, however, are not differentiated from *Psorophora* and the structure of the female abdomen is the same. We therefore recognize the group only as a subgenus. A single species (separated under the name *Ceratocystia*) has the same habits, but the larva instead of having a swollen air-tube has enormously enlarged antennæ, which structure, curiously enough, seems to possess essentially the same function as the enlarged air-tube.

Certain species belonging to *Janthinosoma* (sensu restr.) have been shown to be the carriers of the eggs of the large flies of the genus *Dermatobia*, whose maggots infest animals and man. The *Dermatobia* eggs are fastened on the under side of the base of the abdomen of the mosquito, in exactly what manner has not been observed; but they are so carried by the mosquito and hatch when the mosquito bites a warm-blooded host.

PSOROPHORA POSTICATUS (Wiedemann).

Culex posticatus Wiedemann, Dipt. Exot., i, 43, 1821.
Culex posticatus Robineau-Desvoidy, Mém. Soc. Hist. Nat. Paris, iii, 410, 1827.
Culex posticatus Wiedemann, Aussereur. Zweifl. Ins., 9, 1828.
Culex posticatus Giles, Gnats or Mosq., 278, 1900.
Janthinosoma musica Theobald (in part, not Say), Mon. Culic., i, 255, 1901.
Janthinosoma discrucians Giles (not Walker), Gnats or Mosq., 2 ed., 339, 340, 1902.
Janthinosoma musica Giles (in part, not Say), Gnats or Mosq., 2 ed., 339, 340, 1902.
Janthinosoma musica Theobald (not Say), Mon. Culic., iii, 126, 1903.
Janthinosoma musica Lutz (not Say), in Bourroul, Mosq. do Brasil, 39, 71, 1904.
Janthinosoma musica Goeldi (not Say), Os Mosq. no Pará, 117, pl. 4, fig. 15, 1905.
Janthinosoma echinata Grabham, Can. Ent., xxxviii, 311, 1906.
Janthinosoma sayi Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xiv, 181, 1906.
Culex posticatus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 8, 1906.
Janthinosoma posticata Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 17, 1906.
Janthinosoma posticatus Dyar & Knab, Proc. Biol. Soc. Wash., xix, 161, 1906.
Janthinosoma coquillettii Theobald, Mon. Culic., iv, 153, 154, 1907.
Janthinosoma sayi, var. *jamaicensis* Theobald, Mon. Culic., iv, 157, 1907.
Aëdes posticata Busck, Smiths. Misc. Colls., quart. iss., iii, 63, 1908.
Janthinosoma musica Peryassú (not Say), Os Culic. do Brazil, 151, 1908.
Janthinosoma sayi Theobald (in part), Mon. Culic., v, 119, 1910.
Janthinosoma sayi jamaicensis Theobald, Mon. Culic., v, 119, 1910.
Janthinosoma coquillettii Theobald, Mon. Culic., v, 120, 1910.
Janthinosoma echinata Theobald, Mon. Culic., v, 121, 1910.
Janthinosoma centrale Brèthes, Bol. Inst. Ent. y de Patol. Veg., i, 20, 1912.

ORIGINAL DESCRIPTION OF CULEX POSTICATUS:

Fuscus, chalybeo-nitens; tarsis posticis nigro-ciliatis, apice albis. Longit. lin. 2 1/2. fem. Mexico.

Antennae, proboscis, palpi fusca; certo situ obscure chalybeo-nitentia: caput flavicans. Thorax detritus fuscus, parum chalybeo-nitens; abdomen distinctius chalybeum; venter incisuris late albidis. Alae fusco-squamulosae; halteres flavicantes. Pedes chalybei; femora usque ad apicem fere flavicantia; tibiarum posticarum apex et tarsi supra et infra ciliati, pilis nigro-fuscis, certo situ chalybescentibus; tarsi postici apice late albi. Mus. de Winthem.

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ORIGINAL DESCRIPTION OF JANTHINOSOMA ECHINATA:

♀. Head covered with flat spindle-shaped yellow scales, mingled with black hairs, a few long yellow hairs projecting between the eyes, many upright forked scales at the back. Eyes with deep purple reflections, bordered posteriorly with silvery-white scales. Antennæ brown, basal segment deep brown, second slightly inflated, with a few short black hairs. Proboscis black, with violet reflections, speckled with yellow scales. Palpi densely covered with black and yellow scales, the latter predominating in two basal joints. Clypeus black. Prothoracic lobes with a few golden scales and black hairs. Mesothorax black, with spindle-shaped golden scales scattered over its surface, two denser clusters of these scales on the front margin adjoining the prothoracic lobes, also at the posterior margin between the lateral and mid bare spaces. Two narrow median bare lines running over three-quarters length of the mesothorax, broadening as they approach its anterior margin; a median and two lateral bare areas at the posterior margin. A row of long black hairs above the wing insertions; a number of short black hairs distributed in no definite order over the mesothorax. Scutellum black, clusters of golden scales on the mid and lateral lobes; six to eight black hairs spring from the posterior margin of the mid lobe, and three to four from each of the lateral lobes. Pleura with patches of silvery-white scales. Metanotum deep brown. Abdomen black, with violet reflections, basal segment with long white hairs, apex of each segment bordered with a few long white hairs. Lateral apical patches of white scales in the posterior segments. Venter yellow, densely covered with broad yellow scales, among which are interspersed a few violet scales, especially near the bases of the segments. Legs dark metallic violet, with well-marked knee spots on all the femora. Tibiæ, metatarsi and tarsi of the hind legs densely scaled. Third and fourth tarsi of the hind legs white scaled. All the ungues uniserrate and equal. Wings, first submarginal longer and narrower than the second posterior, its stem less than half its length. Stem of the second posterior cell a little shorter than the cell. Posterior cross vein more than its own length behind the mid cross vein. Halteres with pale stems and knobs. Length, 5.5 mm.

♂.—Antennæ pale brown, second joint slightly inflated, thickly clothed with a number of long-stalked black scales, with fan-like heads, and long black hairs. Proboscis black, with a faint band on its lower third. Palpi longer than the proboscis by the two terminal joints. Two terminal joints inflated and densely black-scaled, a number of long black hairs along the under surface, a few black hairs on the apex of the terminal joint. Antepenultimate joint inflated at the apex, a few black hairs on the under surface near the apex. A single narrow band of golden scales on its lower third. Terminal segment of the clasp greatly dilated in the middle. Harpes, limb extending into a thin lamina at the apex, from the internal border of which a number of long black hairs along the under surface, a few black hairs on the apex of the attached. Harpagones with strong recurved tips and two stout thorn-like tubercles on their convex surfaces. Unci deeply chitinized adherent along their internal borders. Setaceous lobes absent. Ungues of the fore and mid tarsi unequal, the larger with two teeth, a long blunt one and a small basal one; the smaller with a minute basal tooth. Ungues of the hind tarsi uniserrate and equal. Length, 5.5 mm.

The following points were noted in the adult LARVA: Fully grown adult larva nearly 5/16 inch long. Antennæ large and prominent, longer than the head, strongly curved about the middle, deeply fuscous except at the base. Slightly inflated in the lower half. Tuft at the middle of about six fine feathered hairs not exceeding half the antennal shaft of length. Apex with three or four short spines. Surface covered with stout chitinous spines. Mentum deeply infuscated, somewhat narrowly triangular; teeth dark and numerous; apical tooth large and prominent. Both upper and lower epistomal hairs are double and feathered, extending beyond the margin of the head. Anteantennal tuft of 8–10 feathered divisions. Body glabrous except for a few small scattered dendritic hairs. A small dorsal patch of minute thorn-like spines, arranged in curved lines, on each segment from the second to the seventh. Lateral hairs of the abdomen paired and flattened; on the anterior segments each hair is large and 4- to 7-branched, hairs becoming smaller and with fewer branches on the hinder segments. Comb of six or seven scales in a curved row, the largest in the middle. Central scales joined by a thin broad chitinous band, the upper and lower scales separate, base of each scale oval, sides coarsely setose below, the apical free border with one curved stout central spine and two to six much shorter lateral spines. Air tube fusiform, inflated, deeply infuscated, devoid of hairs, about four times as long as wide (at the base); pecten rows of four well-separated teeth in each, a fifth small pair at the extreme base in some specimens; rows one-quarter length of tube; upper two pairs of teeth with two or three smaller denticulations on the inner side, lower pairs with denticulations on both sides. Band ringing the anal segment about as long as broad; barred area running along whole length of the band.

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Ventral tufts of 18–20 pairs. A pair of tufts and long simple setae dorsally. Anal gills very long, narrow, pointed, 2 1/2 times as long as the longest hairs of the ventral brush. Pupa with short, stout siphons.

Observations.—Four living larvæ of this handsome species were taken from a temporary pool in a logwood thicket, about 5 3/4 miles along the Molynes Road, near Kingston, early in April, 1906. The larva is large and stout, the head, which is much compressed antero-posteriorly, is set at right angles to the thorax, and the large antennæ are carried almost vertically downwards, giving the larva a peculiar appearance. The description of the larva is drawn up from the larval skin casts, that of the adult head, thorax and abdomen from the freshly-killed specimens. A notable feature in the male is the thickly-scaled second antennal joint.

ORIGINAL DESCRIPTION OF JANTHINOSOMA SAYI, VARIETY JAMAICENSIS:

A series of five ♀'s taken by Lord Walsingham exactly resemble the typical *sayi*, but in all the specimens the last two hind tarsals only are white, the white not spreading at all on to the apex of the second tarsal segment, as seen in *sayi*.

Habitat.—Runaway Bay (Lord Walsingham); Kingston, Jamaica (Dr. Grabham).

Time of capture.—April and July.

Note.—It is possibly a distinct species.

ORIGINAL DESCRIPTION OF JANTHINOSOMA CENTRALE:

♀ Cabeza negra, occipucio, mejillas, base de los palpos, de las antenas y de la trompa testáceos; escamas detrás de los ojos doradas, las erguidas en tornillo, las recostadas hacia los lados fusiformes. Antenas pardas con vellosidad y pelos verticilados del mismo color. Trompa parda hacia la extremidad. Palpos cortos con escamas azul obscuro. Tórax píceo con escamas doradas fusiformes esparcidas en el dorso y algunos pelos largos hacia la parte posterior. Escudete y metanoto testáceos obscuros, el escudete con tres grupos de pelos largos. Abdomen negro, por arriba de un violeta púrpura y por debajo con escamas doradas excepto los ángulos anteriores de cada segmento que son invadidos por las escamas obscuras como en el dorso. Alas un tanto parduzcas con escamas pardas; en la costa sobre todo y en la 1ª vena longitudinal hay escamas negras. Las dos horquetas nacen al mismo nivel. Patas de un purpúero-azulado, coxas y fémures (éstos en más de su mitad basal) testáceos. Los tarsos posteriores tienen sus 4º y 5º artejos así como la misma extremidad del tercero blancos.

Long.: 6,5 mm.

Hab.: Buenos Aires e islas del Paraná.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF PSOROPHORA POSTICATUS:

Female.—Proboscis moderate, cylindrical, uniform, labellæ small, conical; vestiture of appressed blue-black scales and small curved black setæ, those on labellæ more prominently outstanding. Palpi about one-fourth as long as proboscis, clothed with blue-black scales, brilliant violet ones at tip, and a few long setæ at base. Antennæ slender; tori subglobose, with an excavated tip, smooth, pale brown within and beneath, blackish above; second joint a little longer than the following ones, blackish, setose; hairs of whorls sparse and rather long basally. Clypeus elongate, prominent, tapered in front, convex, dark brown, shining, nude. Eyes black. Occiput narrow, anterior half devoid of scales, blackish, with a number of bristles; posterior half yellowish, densely clothed with erect, golden-brown, forked-tipped scales, some broad and flattened yellow scales intermixed, the sides with flat, broad yellowish scales; cheeks silvery white scaled.

Prothoracic lobes large, well separated, with black bristles and a tuft of flat golden-yellow scales at apex. Mesonotum yellowish brown, broadly black centrally, uniformly and rather densely covered with flat, broad, pale golden-yellow and lanceolate dark brown scales intermixed and rather short black bristles; there is a small ante-scutellar bare space but no subdorsal bare stripes. Scutellum trilobate, with flat golden-yellow scales and a group of about eight black bristles on each lobe. Postnotum roundedly tapered behind, dark brown, nude. Pleuræ brown, covered with flat white scales; coxæ pale brown with white scales, a few black scales on anterior pair and short black bristles.

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Abdomen subcylindrical, slender, posterior segments tapered; dorsal vestiture of flat black scales with strong violaceous reflection; a row of lateral segmentary apical golden spots; first segment with a dorsal patch of violet scales and with many brown hairs; venter violet-black scaled at bases of segments, apical three-fourths clothed with flat golden-yellow scales, except on distal segments, where the dark scales prevail.

Wings moderate, membrane infuscated, with strong iridescent reflection; veins brown; petiole of second marginal cell shorter than its cell, that of second posterior cell about equal to its cell; basal cross-vein distant from anterior cross-vein about half its own length; scales of veins black with a blue reflection in certain lights, rather narrow, the outstanding ones towards apex of wing larger and broader, narrowly lanceolate. Halteres pale, the knobs slightly darker.

Legs rather long and slender, posterior tibiæ distally and most of the hind tarsi apparently thickened by dense outstanding scales; femora yellowish towards base; fore and mid legs otherwise clothed with black scales with a strong blue reflection; knees dull silvery white scaled; tibiæ and tarsi blue black, except on hind legs, where the last two tarsal joints and the apex of the third are white. Claw formula, 1.1–1.1–1.1.

Length: Body about 6 mm.; wing 5.5 mm.

Male.—Proboscis straight, basally slender, slightly and gradually thickened apically. Palpi exceeding the proboscis by nearly the length of the last two joints, which are moderately thickened; last joint shorter than the penultimate one; vestiture violet black; apex of the long joint and the last two with dense, long black setæ, a narrow bare white ring at the false articulation before middle of long joint. Antennæ plumose, with last two joints long and setose, the others short, blackish at insertion of the long, dense blackish whorls, pale beyond. Coloration similar to the female. Abdomen elongate, strongly depressed, with pale lateral ciliation, the latero-apical golden spots visible from above. Wings narrower than in the female, the stems of the fork-cells a little longer and the cross-veins more nearly in line; vestiture sparser. Claw formula, 2.1–2.1–1.1.

Length: Body about 5 mm.; wing 3.7 mm.

Genitalia (plate 21, fig. 149): Side-pieces expanded, truncate at tip, apical lobe prominent but scarcely differentiated. Clasp-filament small at base, greatly inflated beyond middle, extreme tip again slender, recurved and with a small articulated terminal spine. Harpes concave, the margins narrowly revolute, bearing an apical tooth. Harpagones with a long, slender stem reaching to tip of side-piece, apex a little expanded and bearing a row of about seven stout hooked-tipped setæ and a single leaf-like appendage with a recurved tip. Unci forming a tapering plate with revolute margins.

Larva, Stage IV.—Head large, transverse, widest through eyes; antennæ long, uniform, spinose, a hair-tuft before middle; dorsal head-hairs in twos, ante-antennal tuft multiple. Lateral comb of eighth segment of seven scales, attached by their pointed bases to a small chitinous plate, each large, with lateral spines and a long central one. Air-tube inflated, fusiform, with a pecten of four small separated teeth near the base; hair-tuft rudimentary. Anal segment longer than wide, ringed by a chitinous band; dorsal tuft of a hair and tuft on each side; lateral hair minute; ventral brush distributed along ventral line nearly to base. Anal gills long, equal, pointed.

Goeldi has figured and described the eggs, obtained from captured females. He did not succeed in obtaining larvæ, apparently because the eggs must remain dormant for some time in a desiccated condition. The eggs show the same coarsely spinose surface as those of the other members of the genus. The larvæ live in temporary rain-puddles. Dr. Grabham found them in a temporary pool in the forest. Mr. Busck got them in open pools at Arima, Trinidad. Mr. Knab

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got them in a large muddy puddle in the bed of a stream at Almoloya, Mexico, in a pond choked by vegetation near Puntarenas, Costa Rica, in a puddle within the shell of a large tree that had been burned at the same place, and in a shallow, weed-grown ditch along the railroad tracks at Zent, Costa Rica. The females attack man and the bite is said to be painful. Goeldi states that they are diurnal, attacking persistently during the hot hours, and that they are found in the forest and in the open. The habits are not known further, but probably agree with those of the allied species.

Tropical America, Mexico and the West Indies to the Argentine.

São Paulo, Brazil (A. Lutz); New Amsterdam, British Guiana, May 4, 1907 (J. Aiken); Berbice, British Guiana (J. Aiken); Georgetown, British Guiana (E. D. Rowland); Surinam (H. Polak); Trinidad, British West Indies, June, 1905 (A. Busck); Kingston, Jamaica (M. Grabham); Santo Domingo, August, 1905 (A. Busck); Las Cascadas, Canal Zone, Panama, May 15, 1907 (A. Busck); Tabernilla, Canal Zone, Panama (A. Busck); Lion Hill, Canal Zone, Panama (A. Busck); Taboga Island, Panama, July 1, 1907 (A. Busck); Chagres River, Panama, June 7, 1907 (A. Busck); Culebra, Panama, February 5, 1904 (W. M. Black); Gatun, Canal Zone, Panama, June 23, 1908 (A. H. Jennings); Miraflores, Canal Zone, Panama, January 1, 1909 (A. H. Jennings); Bluefields, Nicaragua (W. F. Thornton); Zent, 20 miles from Puerto Limon, Costa Rica, September 26, 1905 (F. Knab); Las Loras near Puntarenas, Costa Rica, September 8, 1905 (F. Knab); Corinto, Nicaragua, September 4, 1905 (F. Knab); Cacao, Trece Aguas, Alta Vera Paz, Guatemala, April 26, 1907 (Schwarz and Barber); Livingstone, Guatemala, November 5, 1907 (H. S. Barber); Sonsonate, Salvador, August 19, 1905 (F. Knab); Tonala, Mexico (A. Dugès); Santa Lucrecia, State of Vera Cruz, Mexico, June 21, 1905 (F. Knab); Tehuantepec, Mexico, July 5, 1905 (F. Knab); Almoloya, State of Oaxaca, Mexico, July 19, 1905 (F. Knab). Reported also from Buenos Aires and the islands of the Paraná, Argentine (Brèthes); States of Rio de Janeiro and Bahia, Brazil (Lutz); Pará, Brazil (Goeldi); Pernambuco, Minas Geraes, Matto Grosso, Brazil (Peryassú).

The synonymy of *Psorophora posticatus* is considerably confused, but we think that we have correctly identified Wiedemann's species. A variety occurs, especially in the Antilles, in which there is no white tip on the third hind tarsal joint. This was named *echinata* by Dr. Grabham and *jamaicensis* by Theobald. A majority of the specimens from the Antilles, perhaps two-thirds, are of this form, but the normal form also occurs. On the mainland the variety occurs in much smaller proportion, perhaps 1 in 10; but its occurrence proves that a distinct species is not involved, nor yet a geographical race. Theobald has applied the name *posticata* to specimens from the Antilles with only the last tarsal joint white and which are here treated as *Psorophora terminalis*. Dr. Howard has examined the type of Wiedemann's *Culex posticatus* at Vienna and found that two joints of the hind tarsi are white and a statement to that effect was published by Coquillett (U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 8, 1906). We have not seen specimens from the Argentine, but there can hardly be a doubt that *Janthinosoma centrale* Brèthes is a synonym.

PSOROPHORA TERMINALIS (Coquillett).

Janthinosoma posticata Theobald (not Wiedemann), Mon. Culic., i, 253, 1901.
Janthinosoma posticata Giles (not Wiedemann), Gnats or Mosq., 2 ed., 339, 341, 1902.
Ianthinosoma posticatum Blanchard (in part, not Wiedemann), Les Moust., 233, 1905.
Janthinosoma terminalis Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. No. 11, 8, 17, 1906.
Janthinosoma posticata Theobald (not Wiedemann), Mon. Culicid., iv, 154, 1907.
Janthinosoma posticata Theobald (not Wiedemann), Mon. Culic., v, 120, 1910.

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ORIGINAL DESCRIPTION OF JANTHINOSOMA POSTICATA Theobald, not CULEX POSTICATUS Wiedemann:

Thorax brown, rather testaceous behind, with flat, spindle-shaped, bronzy and yellow scales. Abdomen steel-black with metallic violet scales, with basal triangular patches of creamy scales; venter yellow scaled. Legs dark brown with metallic steely and purple reflections, the last hind tarsal joint dull white, legs densely scaly. Wings with a brownish tinge.

♀. Head steely-black, with dense, golden, forked upright scales behind, a few flat rather broad, creamy ones in front and a few purplish and then creamy ones at the sides; eyes pale steel colour and black; bristles in front of the head black, two golden ones between the eyes; antennae brown with the basal joint on the outside bright testaceous, dark on the inside, second joint also testaceous, but darker; palpi testaceous, covered with steely-black scales, the testaceous colour shows through at their base; proboscis metallic purple in some lights with creamy scales just at the base, brown in others.

Thorax shiny, purplish-brown in front, testaceous behind, with scattered, flat, spindle-shaped, bronzy black and yellow scales, the dark ones predominating, with three rows of black bristles, the median one ending before the bare patch in front of the scutellum; scutellum darker in the middle than at the sides, with flat, bronzy scales and black bristles; metanotum pale chestnut-brown; pleurae pale ochraceous-brown with numerous white scales. Abdomen when denuded steel-blue, covered with bright metallic purple scales, the first segment ochraceous with two patches of deep purple scales and golden bristles; posterior borders with golden hairs; laterally are triangular basal patches of creamy scales on each segment; venter nearly covered with yellow scales.

Legs covered with dark brownish-black scales, with metallic steely and purplish reflections, knee spots white, bases and venter of femora yellowish, last tarsal joint of the hind legs dull white.

Wings with a slight brownish tinge, scales brown, lateral ones moderately long and narrow; first sub-marginal cell very little longer and narrower than the second posterior cell, its stem equal to nearly half the length of the cell; stem of the second posterior cell nearly the same length and about as long as the cell; posterior cross-vein distant a little more than half its own length from the mid cross-vein.

Halteres with pale stem and fuscous knob.

Length.—5 mm.

Habitat.—Castries, St. Lucia (St. George Gray) (19. 7. 99); Argentina (Arribalzaga).

Time of capture.—August in St. Lucia.

Observations.—Described from a single female sent by Dr. St. George Gray, with note that it was taken at 7 P. M. in the Botanic Gardens, Castries.

It is evidently Wiedemann's *Culex posticatus* described from Mexico, and may be told from the allied *C. musicus*, Say, by the last tarsal joint only being white.

I cannot see the ungues properly in the single specimen sent, but one on each foot is in any case toothed; they are probably both equal and serrated.

ORIGINAL DESCRIPTION OF JANTHINOSOMA TERMINALIS:

The type [of *Culex posticatus*] has the last two joints of the hind feet wholly white; *Janthinosoma musica* Say is a synonym. The *Janthinosoma posticata* of Theobald, in which the last joint of the hind feet is white, is therefore a different species, for which the writer proposes the name **terminalis**.

Unrecognized species [of *Janthinosoma: J.*] *terminalis* Coquillett (*posticata* Theobald, not of Wiedemann), was described from St. Lucia, W. Ind., and differs from all of the other species in that the last joint only of the hind feet is white.

We possess no specimens of this species. The larva is unknown.

Nothing is known of the life history and habits.

St. Lucia, West Indies and Argentine (Theobald).

Mr. Theobald described a single specimen from the island of Santa Lucia under the name *Janthinosoma posticata* Wiedemann; Mr. Coquillett recognized from the description that it was wrongly identified, and proposed a new name for it. No specimens of this form are before us, but Mr. Busck has examined the specimens in the British Museum, and reports that there are five specimens from St. Lucia (Gray); the last hind tarsal joint only is white, but not equally distinctly white in all the specimens. We have noted above that specimens of

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Psorophora posticatus from the Antilles have a tendency to loss of white on the hind tarsi. In the present form the tendency is apparently intensified, the white area being still further reduced. The record from the Argentine seems doubtful.

PSOROPHORA SAYI (Dyar & Knab).

Culex musicus Say (not Leach), Journ. Acad. Nat. Sci. Phil., vi, 149, 1827.
Culex musicus Say, Ent. of N. Amer., ii, 348, 1883.
Culex musicus Giles (not Leach), Gnats or Mosq., 276, 1900.
Culex posticatus Coquillett (not Wiedemann), U. S. Dept. Agr., Div. Ent., Circular 40, 2 Ser., 6, 1900.
Culex posticatus Howard (not Wiedemann), U. S. Dept. Agr., Div. Ent., Bull. 25, n. s., 20, 1900.
Conchyliastes musicus Howard, Mosquitoes, 155, 236, 1901.
Janthinosoma musica Theobald (in part), Mon. Culic., 1, 255, 1901.
Conchyliastes musicus Morgan, U. S. Dept. Agr., Div. Ent., Bull. 37, n. s., 113, 1902.
Conchyliastes musicus Dupree & Morgan, Science, n. s., xvi, 1037, 1902.
Janthinosoma discrucians Giles (not Walker), Gnats or Mosq., 2 ed., 339, 340, 1902.
Janthinosoma musica Giles (in part), Gnats or Mosq., 2 ed., 339, 340, 1902.
Janthinosoma musica Theobald, Mon. Culic., iii, 124, 1903.
Conchyliates musicus Morgan & Dupree, U. S. Dept. Agr., Div. Ent., Bull., 40, n. s., 90, 91, 1903.
Janthinosoma musicum Dyar, Journ. N. Y. Ent. Soc., xii, 173, 1904.
Janthinosoma musica Felt, Bull. 79, N. Y. State Mus., 276, 1904.
Ianthinosoma mexicanum Blanchard (not *Culex mexicanus* Bellardi), Les Moustiques, 234, 1905.
Janthinosoma musica Felt, Bull. 97, N. Y. State Mus., 471, 1905.
Janthinosoma musica Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 180, 1905.
Janthinosoma musica Coffin, in Shattuck, The Bahama Ids., 281, 1905.
Janthinosoma sayi Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xiv, 181, 1906.
Janthinosoma posticata Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 17, 1906.
Janthinosoma sayi Dyar & Knab, Proc. Biol. Soc. Wash., xix, 161, 1906.
Janthinosoma sayi Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 3, 1906.
Janthinosoma sayi Theobald, Mon. Culicid., iv, 155, 1907.
Culex (*Janthinosoma*) *posticata* Viereck (not Wiedemann), 1st Ann. Rept. Comm. Health Pa., 470, 1908.
Aëdes sayi Pazos, Anal. Acad. de Cien. med., fis. y nat. de la Habana, xlv, 420, 1908.
Aëdes sayi Pazos, San. y Benef., ii, 46, 191, 1909.
Aëdes sayi Thibault, Proc. Ent. Soc. Wash., xii, 17, 1910.
Janthinosoma sayi Theobald (in part), Mon. Culic., v, 119, 1910.
Aëdes sayi Morse, Ann. Rept. N. J. State Mus., 1909, 717, 1910.

ORIGINAL DESCRIPTION OF CULEX MUSICUS:

Tergum purplish, with lateral yellowish spots.
Inhab. Indiana.

Head dull honey-yellow: *vertex* blackish with yellowish hair: *proboscis* and *palpi* black; *thorax* black-purple, with yellowish hair or scales: *wings* dusky: *poisers* white, a little dusky at tip: *tergum* purple, or violaceous, with a band at base, and large lateral spot on each segment of yellowish hair or scales: *feet* black-violaceous: *thighs*, excepting at tip, and *coxae* whitish, sericeous: *tarsi*, two terminal joints of the posterior pair white.

Length more than one-fifth of an inch.

ORIGINAL DESCRIPTION OF JANTHINOSOMA SAYI (Dyar & Knab):

Culex musicus Say (not Leach), Proc. acad. nat. sci. Phil., vi, 149, 1827.
Ianthinosoma mexicana Blanchard, Les Moustiques, 234, 1905.

The larva is found in temporary rain puddles and develops rapidly, as do all of this genus. It occurs along the Atlantic seaboard as far North as Massachusetts, but is common only further South. The senior author met with it in abundance at Tampa, Florida. The junior author collected it at Santa Lucrecia, Almoloya and Tehuantepec, Mexico; Sonsonate, Salvador; Corinto, Nicaragua; Puntarenas and Port Limon, Costa Rica. Blanchard says that *musicus* Say (preoccupied) is surely the same as *mexicanus* Bellardi; but Coquillett has identified as *mexicana* another species, which he refers to "*Culex*" as it differs in scale structure. We therefore propose the new name *sayi* for our familiar species.

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ORIGINAL DESCRIPTION OF JANTHINOSOMA SAYI (Theobald):

Synonymy.—Coquillett makes Say's *musicus* the same as Wiedemann's *posticatus*. The latter species has the last hind tarsal white.

The specimens I re-described of *posticata* (p. 253, Vol. I) answer exactly to Wiedemann's description, and *musicus* of Say is seen to be totally distinct. Unfortunately Say's name, *musicus* (1827), was used in 1825 by Leach for a *Culex*, and thus does not stand. I have thus renamed the insect after its describer.

DESCRIPTION OF FEMALE, MALE, LARVA, PUPA, AND EGG OF PSOROPHORA SAYI:

Female.—Proboscis moderately long, uniform; labellæ rather sharply tapered, with a few small outstanding setæ; vestiture of appressed brownish-black scales. Palpi less than one-third as long as proboscis, clothed with black scales with a bright blue luster, tipped with brilliant violet scales. Antennæ black, the joints subequal, pilose; tori subglobose, with a cup-shaped apical hollow, pale luteous within, brown without; second joint luteous at base, with a few black scales; hairs of whorls sparse, rather short, black. Clypeus prominent, elongate elliptical, rounded at both ends, nude, blackish brown, shining. Eyes black. Occiput dark brown anteriorly, luteous posteriorly, posterior half densely clothed with erect, slender, forked, golden-yellow scales, intermixed with very broad, yellow, flat and suberect scales, some subovate, whitish scales anteriorly and on the cheeks, some yellow hairs projecting at the vertex.

Prothoracic lobes blackish brown, moderate in size, remote, with a cluster of flat, broad white scales on the summit and brownish-tipped setæ below. Mesonotum nearly black, covered with flat, broad golden-yellow and blackish-brown scales intermixed, forming no defined pattern; dorsal bare stripes hardly indicated; ante-scutellar bare space small; a number of brownish-tipped setæ, longest and most numerous posteriorly and at roots of wings. Scutellum trilobate, dark brown, middle lobe the most prominent, blackish centrally, each lobe with flat golden scales and a group of about eight long black setæ. Postnotum elliptical, brown, shining, nude. Pleuræ dark brown, clothed with broad, white appressed scales; coxæ pale, with patches of white scales and rows of brown bristles.

Abdomen subcylindrical, flattened, terminal segments distinctly tapering; clothed dorsally with flat black scales with a bright violet luster, a series of large, lateral, triangular, whitish yellow spots, their bases at apices of the segments; venter entirely clothed with whitish-yellow scales with a very few blackish ones intermixed; seventh segment violet beneath with whitish yellow lateral and posterior margins; setæ not abundant, rather short, dark.

Wings moderate, membrane hyaline with a very slight smoky tint and an iridescent reflection; petiole of second marginal cell shorter than its cell, that of second posterior cell also somewhat shorter; basal cross-vein less than its own length distant from anterior cross-vein; veins dark brown, the smoky color slightly intensified in their immediate vicinity; scales brownish black, the outstanding ones slender, narrowly lanceolate, most of them blunt at tips. Halteres almost entirely pale.

Legs rather long and slender, posterior legs with the apical third of the tibiæ and the three proximal tarsal joints apparently thickened by dense obliquely outstanding scales; femora pale yellowish brown beneath nearly to tips; apices of femora white scaled, broadest on hind pair; legs otherwise clothed with black scales with a bright violet-blue metallic luster, last two joints of hind tarsi and tip of third joint white. Claw formula, 1.1–1.1–1.1.

Length: Body about 5 mm.; wing 4.5 mm.

Male.—Proboscis straight, moderately long, nearly uniform. Palpi exceeding the proboscis by somewhat less than the length of the last two joints; the two terminal joints thickened, the penultimate one the longer; vestiture black with a bright blue reflection; last two joints and apex of long joint with long

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black hairs, a pale ring devoid of scales at the false articulation of long joint. Antennæ plumose, the two terminal joints long and pilose, the rest short, black at insertions of the whorls, white beyond; second joint pale at base; hairs of whorls long, blackish. Coloration similar to the female. Abdomen elongate, strongly depressed, with long, pale, lateral ciliation; the yellowish white lateral spots are on the dorsal aspect; venter with basal segmental bands of blue-black scales. Wings much narrower than in the female, with hardly any trace of smoky tint, the stalks of the fork-cells slightly longer, cross-veins more remote, scales sparser. Claw formula, 2.1–2.1–1.1.

Length: Body about 4.5 mm.; wing 4.2 mm.

Genitalia (plate 20, fig. 146): Side-pieces about twice as long as wide, conical at tip, lobes scarcely differentiated. Clasp-filament small at base, greatly inflated beyond middle, extreme tip again slender, recurved, and with a small articulated terminal spine. Harpes concave, margins narrowly revolute, bearing an apical tooth. Harpagones with a long, slender stem nearly reaching to tip of side-piece, apex a little expanded and bearing a row of about seven stout hook-tipped setæ and a single leaf-like appendage with a recurved tip. Unci forming a tapering plate with revolute margins.

Larva, Stage IV (plate 115, fig. 390).—Head rounded, wider than long, narrowed before the eyes, a slight notch at insertion of antennæ, front margin broadly arcuate. Antennæ very long, longer than head, slender, a little swollen toward base, spined all over; a large tuft of long branched hairs a little before middle; three long spines and two small digits at tip. Eyes large, transverse, pointed. Both pairs of dorsal head-tufts double, ante-antennal tuft multiple. Mental plate triangular, with a central large tooth and thirteen on each side, rather small, alike, closely set. Mandible quadrangular, indented without at middle, smooth; two long filaments before tip; an outer row of stout cilia; nine little tufts of two hairs each from conical projecting bases; dentition of four teeth on a process, the first and fourth longer; a filament without, small separated teeth at base, a double serrate filament and seta within; process below simple, with patches of hair; an angle below it; two groups of three long hairs each; six long hairs at base. Maxilla elongate hemispherical, divided by a narrow suture; inner half spined; a row of long cilia on suture at tip; outer half with some rudimentary spines toward palpus and a short filament on each side. Palpus small and slender with two digits and two small rudimentary ones. Thorax rounded, wider than long, robust; hairs abundant but not long. Abdomen stout, anterior segments shorter; lateral tufts multiple on first segment, double on second, single on third to sixth. Tracheal tubes broad, band-shaped, irregularly flexuous posteriorly. Air-tube large, strongly inflated, tapered on outer half, about three times as long as wide; pecten of three teeth on basal fifth of tube; single tooth with broad base, a long spine at one end, three subbasal ones, the middle one longest. Lateral comb of eighth segment of six or seven subequal scales in a line; single scale three times as long as wide, with a long terminal spine and five stout spines on each side, the subapical one slightly curved. Anal segment much longer than wide, ringed by the plate; dorsal tuft a long hair and brush on each side; a small lateral tuft; ventral brush well developed, extending along ventral line to near base. Anal gills long, much longer than the segment, tapered to a sharp tip; a slight central trachea.

Pupa (plate 149, fig. 705).—Thoracic mass subpyriform; three small tufts anteriorly; air-tubes rather long, slender, slightly notched at tip; abdomen rather stout, the hairs and tufts moderate, a small lateral tuft on eighth segment; anal paddles with two small terminal hairs.

Egg (plate 146, fig. 675).—Fusiform, flattened on one side, rather long and narrow; sculpture elongate hexagonal reticulations; from the micropylar end

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of each there arises a recumbent, stout blunt spine, two-thirds the length of the reticulation.

The larvæ live in temporary rain-puddles. The coat of spines with which the eggs are covered probably serve to prevent desiccation. The eggs are apparently laid upon the ground at a place where water is liable to collect, and remain unhatched until after a rain. The winter is passed in the egg-state. We have no direct observations on the life history and nothing is known of the mating habits of the adults. The larval stages are passed rapidly, as with all the species of this group. In the northern part of its range the larva is rare, being seldom found. Dr. Dyar obtained one larva in a puddle in a road at Grassymead, Virginia. The adult females are active and voracious biters, but are only common enough to be troublesome in the South. They are not in the habit of frequenting houses. Apparently they are diurnal. Mr. Barber has observed the males on flowers and Mr. Knab captured a female specimen on a flower. Mr. Thibault states that the female is "one of the most persistent as well as painful biters. Also troublesome to stock."

Atlantic and Gulf States, Mississippi Valley, Cuba, and Bahamas.

Chicopee and Springfield, Massachusetts, July 16, 1903 (F. Knab); Saxeville, Wisconsin, July 29, 1909 (B. K. Miller); Algonquin, Iowa (H. J. Quayle); Hyattsville, Maryland, September 1 (A. Busck); Glencarlyn, Virginia, July 23, 1901 (N. Banks); Washington, District of Columbia, September 9, 1901 (W. E. Hinds); Luray, Virginia, September 2, 1906 (F. Knab); Woodstock, Virginia (F. C. Pratt); Plummer's Island, Maryland (H. S. Barber); Greensboro, North Carolina, August 8, 1901 (F. C. Pratt); Columbia, South Carolina, August 1, 1906; Agricultural College, Mississippi, May 18, 1901 (G. W. Herrick); Jackson, Tutwiler, Belzona, Clarksdale, Westpoint, and Corinth, Mississippi, August, 1904 (H. S. Barber); Natchez, Mississippi, July 23, 1904 (F. S. Shaw); Rives and Athens, Tennessee, August, 1904 (H. S. Barber); Helena, Arkansas, July 30, 1904 (H. S. Barber); Scott, Pulaski County, Arkansas, August 11, 1909 (J. K. Thibault, Jr.); Corbin, Kentucky, August 24, 1904 (H. S. Barber); Jacksonville, Texas, October 12, 1905 (W. D. Pierce); Dennison, Texas, June 25, 1904 (H. S. Barber); Dallas, Texas, August 31, 1906 (F. C. Pratt); West Tampa, Florida, March 18, 1905 (H. G. Dyar); Tarpum Bay, Bahamas, 1903 (T. H. Coffin); Cayamas, Cuba, May 30 (C. F. Baker, E. A. Schwarz).

Psorophora sayi is closely related to *P. posticatus* and the two have been confused by most authors. They may be readily distinguished by the ornamentation of the abdomen, the present species having the venter nearly wholly pale-scaled, while in *posticatus* there are broad violaceous bands. The white on the hind tarsi varies in extent, in some specimens being restricted to the last two joints, in others involving the apical portion of the third joint. The latter is the common form on the mainland, while the former prevails in Cuba and the Bahamas, but these limits are not absolute.

PSOROPHORA LUTZII (Theobald).

Janthinosoma lutzii **Theobald, Mon. Culic., i, 257, 1901.**
Janthinosoma lutzii **Giles, Gnats or Mosq., 2 ed., 339, 1902.**
Janthinosoma lutzii **Parker, Beyer and Pothier, Bull. 13, Yell. Fever Inst., U. S. Publ. Health & Marine-Hosp. Serv., 37, 40, 1903.**
Janthinosoma discrucians **Theobald (not Walker), Mon. Culic., iii, 126, 1903.**
Ianthinosoma discrucians **Blanchard (not Walker), Les Moustiques, 232, 1905.**
Ianthinosoma lutzi **Blanchard, Les Moust., 236, 1905.**
Janthinosoma lutzii **Goeldi, Os Mosq. no Pará, 119, pl. 4, fig. 16, 1905.**
Janthinosoma lutzii **Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. No. 11, 17, 1906.**
Janthinosoma albipes **Theobald, Mon. Culic., iv, 157, 1907.**
Aëdes lutzii **Busck, Smiths. Misc. Colls., quart. iss., iii, 63, 1908.**
Janthinosoma lutzi **Peryassú, Os Culic. do Brazil, 152, 1908.**
Janthinosoma albipes **Theobald, Mon. Culic., v, 120, 1910.**

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ORIGINAL DESCRIPTION OF JANTHINOSOMA LUTZII:

Thorax black, with flat spindle-shaped bronzy-black scales in the middle and spindle-shaped creamy-yellow ones forming a broad line on each side of the notum. Abdomen brilliant blue and purple, an apical yellow patch extending across each side of the segment and pale golden ventral bands. Legs metallic purple bases of the femora broadly pale yellowish; last two joints and apex of the penultimate tarsi of the hind legs white.

♀. Head clothed in the middle with curved and small flat irregular golden and ochraceous upright forked ones, purple at the sides; palpi and proboscis with brilliant metallic purple reflections; antennae brown.

Thorax black, with black and bronzy spindle-shaped scales, each side of the notum with golden-yellow spindle-shaped scales forming broad yellow lateral with straight borders to the median dark area; scutellum dark brown, with bronzy-black spindle-shaped scales; metanotum black; pleurae dark brown, creamy-yellow flat scales.

Abdomen steely-black, covered with brilliant metallic blue and purple scales coming dusky towards its apex, with lateral apical golden patches to the segments more or less triangular in form, the base of the triangles being parallel to the borders of the segments; first segment dark, with dusky scales and long golden-hairs; venter purplish, with golden scaled apical cross-bands.

Legs metallic purple in some lights, brown in others; coxae dark with yellow scales; fore and mid femora yellowish at the base below, hind femora with a yellow basal portion; knee spot pale; last two tarsi of the hind legs creamy-white, also the apex of the antepenultimate joint; ungues of the fore and mid legs serrated.

Wings with a brownish tinge; veins clothed with brown scales, those at the base of the wing with purple reflections; lateral scales long, rather broader than in apices convex; first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing; its stem rather less than one-third length of the cell, shorter than the stem of the second posterior cell, which is quite as long as the cell; posterior cross-vein shorter than the mid cross-vein quite its own length distant from it.

Halteres with pale stem and fuscous knob.

Length.—4 to 5 mm.

Habitat.—Itacoatiara, Lower Amazon (Austen); Rio de Janeiro (Lutz).

Time of capture.—February (Amazon).

Observations.—Specimens of this species have been received from Dr. Lutz were named by him *Janthinosoma discrucians*, Wlk. I have compared them with type in the British Museum and find they do not agree. It is clearly a new species which can easily be told from Walker's *Culex discrucians* by the last two hind and the apex of the antepenultimate one being white and by its larger size. *discrucians* "the base of the fourth joint is adorned with a pale yellow band," so figured by Arribalzaga (Plate IV., fig. 6). *C. discrucians* is a *Janthinosoma* Appendix).

It might also be confused with *J. musica*, Say, but the honey-coloured head i species and the non-ornamented thorax should at once separate them. Fr *posticata* it can be told by the last tarsal and apex of the penultimate one only white in that species.

Dr. Lutz writes me that "it occurs in damp woods and shady river shor stings in the daytime. The larva is green. Common in Brazil."

ORIGINAL DESCRIPTION OF JANTHINOSOMA DISCRUCIANS Theobald, not CULEX DISCRUCIANS Walker.

Thorax deep brown, with bronzy brown median scales, with lateral pale c ones. Abdomen metallic purple, with apical lateral silvery white spots; ventr apical silvery white bands. Legs deep metallic violet, bases of the femora pal two hind tarsi white.

♀. Head black, with flat spindle-shaped creamy scales in the middle; flat, yellow and black scales laterally and narrow brown upright forked-scales; proboscis and antennae deep blackish-brown. Thorax black, with narrow c black scales in the middle of the mesonotum and flat spindle-shaped creamy o the sides; scutellum black, with five black bristles to the mid lobe; metanotum brown; pleurae black, with flat creamy white scales. Abdomen metallic violet apical lateral creamy white patches to all the segments except the last, the l patches most prominent on the apical segments; venter with apical bands of c white scales; posterior border-bristles black.

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Legs unbanded, deep brown with violet reflections; coxæ brown, bases of the femora pallid yellowish, last two tarsi of the hind legs white, fore and mid ungues uniserrated. Wings rather short; first sub-marginal cell a little longer and narrower than the second posterior cell, its base nearer the base of the wing than that of the second posterior, its stem about half the length of the cell; stem of the second posterior nearly as long as the cell; posterior cross-vein about its own length distant from the mid cross-vein; halteres with pale stem and black knob.

Length.—3.8 to 4 mm.

Time of capture.—December, in Trinidad (Urich).

Habitat.—South America (Walker); Trinidad, at Aqua Santa (F. W. Urich).

Observations.—The types of ♂ and ♀ in the British Museum are in very bad condition; the ♀ has no legs nor abdomen, and the specimens are much faded.

The specimens from which this description is drawn up are perfect. There is one small difference seen in the type, namely, that the posterior cross-vein is nearer to the mid than in the Trinidad specimens. The central thoracic scales are also bronzy, whilst in the specimens described here they are deep brown, but this is due to fading in the type.

Arribalzaga's *J. discrucians* is larger, being 6 mm. His species has been sent over by Dr. Lutz, and was re-named by Colonel Giles *J. Arribalzagae;* the type, a ♀, is in the Museum. Giles is quite wrong in saying the true *discrucians* has an unadorned thorax; the type shows it just as described here.

ORIGINAL DESCRIPTION OF JANTHINOSOMA ALBIPES:

Janthinosoma discrucians. Theobald (non Walker).

Mono. Culicid. III., p. 126 (1903), Theobald; Les Moustiques, p. 232 (1905), Blanchard; Class. Mosq. N. and M. Amer. Tech. Se. 11, U. S. Dept. Agri., p. 17 (1906), Coquillett.

This proves to be a new species and not *discrucians*, Walker, a mistake having arisen owing to the type (♂) not agreeing with Walker's description.

Additional localities.—Fort Logan, H. Roots, Arkansas (Miss Ludlow).

Coquillett would sink this as a synonym of *J. lutzii*, Theobald, but the latter is quite distinct, having a different ornate thorax and the apex of the second hind tarsal also white.

DESCRIPTION OF FEMALE OF PSOROPHORA LUTZII (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather long, slender, cylindrical, not enlarged at apex, labellæ conically tapered, with a few outstanding setæ; vestiture deep black with a blue reflection in certain lights. Palpi about one-fifth as long as proboscis, scales black with a blue reflection, a few rather long black bristles. Antennæ moderate, the segments subequal, blackish, pilose; tori subspherical, with a cup-shaped hollow tip, smooth, blackish, a few white scales on inner side; second segment slightly thickened, pale on its basal portion; hairs of whorls sparse, black. Clypeus prominent, elongate, elliptical, nude, shining, blackish. Eyes black. Occiput roundedly prominent, blackish, densely clothed with broad, flat, pale-yellow scales, small, upright, forked, pale yellow scales intermixed posteriorly, a small patch of blue-black ones at middle of each side; a row of black bristles near margins of eyes, some pale ones projecting at the vertex.

Prothoracic lobes rather large, remote, black, a sparse covering of pale-yellow scales throughout and numerous black bristles. Mesonotum with black membrane; a broad dorsal area widening posteriorly, clothed with lanceolate deep brown scales and small black bristles; sides of disk densely clothed with small elliptical, pale ochreous yellow scales, many short golden bristles at roots of wings. Scutellum trilobate, the median lobe prominent, black with elliptical brown scales, each lobe with about eight black bristles. Postnotum roundedly prominent, nude, blackish brown. Pleuræ blackish, clothed for the most part with dense, flat creamy white scales; coxæ of fore and mid legs blackish, with a row of black bristles, those of hind legs with a row of pale bristles, each with a patch of flat pale-yellow scales.

Abdomen subcylindrical, posterior segments rapidly tapering; dorsal vestiture of blue-black scales, with large, triangular patches of yellowish ones on posterior angles of the segments, small on the last; first segment with a central patch of yellowish scales and many pale setæ; venter with vestiture blue-black at bases

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of segments, narrowly or rather broadly pale yellow on apices; bristles rather numerous, blackish.

Wings rather broad, membrane with a very faint smoky tinge; petiole of second marginal cell about half as long as its cell, that of second posterior cell somewhat shorter than its cell; basal cross-vein less than its own length from anterior cross-vein; veins blackish, their scales brownish black, dense and the outstanding ones narrowly lanceolate and blunt at tips.

Legs moderately long and slender; femora clothed with violet-black scales outwardly, pale yellow below next the base, the hind ones whole pale golden scaled on basal three-fourths; knees silvery white-scaled; vestiture of tibiæ and tarsi of black scales with faint violaceous luster; posterior tibiæ and first two tarsal joints with the scales dense and suberect; otherwise the vestiture is smooth; last two joints of hind tarsi white. In some specimens the apex of the third joint also is white. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wings 4 mm.

We have no observations upon life history and habits. The adults have been captured in the daytime while attempting to bite. Mr. Knab caught two on a railroad train in tropical Mexico.

Tropical America from Brazil to Mexico, exclusive of the Antilles.

São Paulo, Brazil (A. Lutz); Rupununi, British Guiana (K. S. Wise); Trinidad, West Indies, June, 1905 (A. Busck); Caldera Island, Porto Bello Bay, Panama (A. H. Jennings); Rio Cascajal, Panama (A. H. Jennings); Tabernilla, Canal Zone, Panama, May 13, 1908 (A. H. Jennings); Bocas del Toro, Panama; Bluefields, Nicaragua (W. F. Thornton); Puerto Cortez, Honduras, September 10, 1903 (Dr. Reilly); Cacao, Trece Aguas, Alta Vera Paz, Guatemala, April 2 to 8, 1906 (Schwarz & Barber); Puerto Barrios, Guatemala; Livingston, Guatemala, May 5, 1906 (H. S. Barber); Polochic River, Guatemala, June 2, 1907 (A. McLachlan); Ceiba, Honduras, August 20, 1903 (D. P. Albers); Santa Lucrecia, Mexico, June 21, 1905 (F. Knab); Santa Cruz, State of Vera Cruz, Mexico, June 17, 1905 (F. Knab); Coatzacoalcos, Mexico (A. Dugès); Palizada, Mexico, October 5, 1903 (A. Dugès).

Theobald originally identified certain specimens as Walker's *discrucians* and described them under that name. Later he recognized that they were distinct from *discrucians* and proposed the new name *albipes* for them. The specimens mentioned under the description of *discrucians* are from Trinidad, and the subsequent citiation of a specimen from Arkansas does not affect the type locality, which is Trinidad. Theobald previously described *lutzii* from Brazil, and it is the same species as *albipes*, the synonymy having been determined by Coquillett. However, Theobald objected to it (Mon. Culic., IV, 157) saying it " . . . is quite distinct, having a different ornate thorax and the apex of the second hind tarsal also white." The difference in the ornamentation of the thorax is given thus:

Thorax with a broad yellow-scaled area on each side..... *lutzii* Theobald
Thorax with creamy lateral scales..... *albipes* Theobald

Now, North American specimens have " creamy " scales, not the South American, which have these scales " yellow." It is evident that Theobald wrongly founded his definition of *albipes* upon the Arkansas specimen (which belongs to our species *horridus*), whereas the type locality is Trinidad. We therefore confirm the synonymy established by Coquillett, placing *discrucians* Theobald (not Walker) and *albipes* Theobald as synonyms of *lutzii* Theobald. The presence or absence of white at the apex of the third joint of the hind tarsi, as in other species, is due merely to variation and can not be employed as a specific character.

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PSOROPHORA HORRIDUS (Dyar & Knab).

Janthinosoma lutzii Felt (not Theobald), Bull. 97, N. Y. State Mus., 471, pl. v, fig. 2, 1904.
Janthinosoma lutzii Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 17, 1906.
Janthinosoma albipes Theobald (in part), Mon. Culicid., iv, 157, 1907.
Aëdes horridus Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 56, 1908.
Aëdes horridus Thibault, Proc. Ent. Soc. Wash., xii, 18, 1910.
Janthinosoma albipes Theobald (in part), Mon. Culic., v, 120, 1910.
Aëdes horridus Theobald, Mon. Culic., v, 620, 1910.

ORIGINAL DESCRIPTION OF AËDES HORRIDUS:

Proboscis and palpi clothed with violet-black scales; occiput whitish-scaled, with a violet-black spot at the side; mesonotum broadly yellowish white-scaled at the sides, a band of deep brown scales occupying about one-third of the width of the disk and extending back to the antescutellar space, the lateral yellowish white scales surrounding the antescutellar space behind; scutellum yellowish white-scaled; postscutellum densely yellowish white-scaled; abdomen above violet blue with lateral apical yellowish spots on all but the last segments, beneath yellowish-scaled, the seventh segment with basal violet scales, eighth segment entirely violet-scaled. Legs deep violet-scaled, the basal two-thirds of the femora yellowish, the knees silvery white, the hind legs with the scales on the tibiae and tarsi roughened, suberect, the last two joints white. Length, 4.5 mm.

Fifty-six specimens: Victoria, Texas, May 31 (W. E. Hinds); Cypress Bayou, Texas, August 23, 1903 (J. D. Mitchell); Greenville, Texas, June 30, 1904 (H. S. Barber); Dallas, Texas, June 28 (H. S. Barber); Dennison, Texas, June 24 (H. S. Barber); Westpoint, Mississippi, August 11, 1904 (H. S. Barber); Corinth, Mississippi, August 14 (H. S. Barber); Jackson, Mississippi, August 8, 1904 (H. S. Barber); Vanburen, Arkansas, July 6, 1904 (H. S. Barber); Fort Smith, Arkansas, July 8 (H. S. Barber); Little Rock, Arkansas, July 11, 1904 (H. S. Barber); Danville, Arkansas, July 10 (H. S. Barber); Helena, Arkansas, July 30 (H. S. Barber); Chattanooga, Tennessee, August 20, 1904 (H. S. Barber); Rives, Tennessee, July 27 (H. S. Barber); Wister, Oklahoma, July 2 (H. S. Barber); Woodstock, Virginia, August 4, 1904 (F. C. Pratt); Plummer's Island, Maryland, July 18, 1904 (R. P. Currie).

Type.—Cat. No. 11999, U. S. N. M.

This species has been identified heretofore as *Janthinosoma lutzii* Theobald and *Janthinosoma albipes* Theobald, but differs obviously from these more southern forms.

DESCRIPTION OF FEMALE AND EGG OF PSOROPHORA HORRIDUS (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather long and slender, uniform, a little thickened towards base, labellæ long and conical; vestiture of dense blue-black scales and very small yellowish setæ, those on labellæ prominent, outstanding, black. Palpi about one-fourth the length of proboscis, clothed with blue-black rough scales and rather long black bristles. Antennæ slender, rather long, segments pilose, second segment slightly longer and stouter than succeeding one; hairs of whorls sparse and rather long; tori globose, blackish, with a cup-shaped, luteous apical depression, a patch of whitish scales on inner side. Clypeus prominent, elliptical, nude, shining, brownish black. Eyes violet black. Occiput densely clothed with very broad, curved yellowish-white scales, many long and slender, pale, erect forked scales, densest on nape, a patch of flat violet black ones at middle of each side; coarse blackish bristles along margins of eyes, some pale ones projecting at the vertex.

Prothoracic lobes rather large, brown, sparsely clothed with broad, curved whitish scales throughout and with numerous brown bristles. Mesonotum black, with a broad median stripe uniformly clothed with narrow, brownish-black scales and short black bristles; anterior edge narrowly and sides of disk broadly clothed with large, very broad, nearly flat yellowish-white scales and numerous rather short blackish bristles; at the sides of the ante-scutellar area the scaling is densely yellowish white. Scutellum trilobate, brown, clothed with flat yellowish-white scales, the lobes with black bristles. Postnotum elliptical, prominent, nude, blackish brown with a slight pruinosity. Pleuræ black-

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ish, clothed with milk-white scales; fore and hind coxæ pale testaceous, with white scales and many pale bristles; mid coxæ brown, with a few white scales.

Abdomen subcylindrical, flattened, tapered posteriorly, cerci prominent, projecting; dorsal vestiture of deep violet-blue scales, sides with large apical, triangular, yellowish-white spots, largest on sixth segment; venter yellowish-white scaled, the sixth segment violet-blue scaled at base, the seventh entirely violet blue.

Wings rather large and ample, membrane faintly infuscated, more distinctly so towards costa; petiole of second marginal cell much shorter than the cell, that of second posterior cell about as long as its cell; basal cross-vein considerably less than its own length from anterior cross-vein; veins dark brown; scales brown with a violet luster, the outstanding ones on apical half of wing broadly linear or ligulate. Halteres yellowish, the knobs white scaled.

Legs rather long and slender; femora yellowish basally, hind pair clothed with yellowish-white scales to apical third, which is deep violet; mid femora deep-violet scaled nearly to base; knees narrowly silvery white scaled; tibiæ and tarsi deep violet scaled with metallic luster; scales on hind tibiæ and first two tarsal joints roughened; last two joints of hind tarsi white, and sometimes also the apex of the third joint. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4 mm.

No specimens of the male are before us.

Male genitalia (plate 21, fig. 147): Side-pieces nearly three times as long as wide, tips conically tapered. Clasp-filament much swollen on outer two-thirds, tip small, with a terminal claw. Harpes concave with revolute inner margin, tip bent and minutely dentate. Harpagones with long slender stem, tip expanded and bearing six setæ and two curled filaments. Unci forming a basal cone.

Life history unknown. The habits of the adults are as in *Psorophora sayi*.

Egg (plate 146, fig. 673).—Fusiform, somewhat flattened on one side, rather long; sculpture of elongate, hexagonal reticulations, from the micropylar end of each arises a stout recumbent spine, about two-thirds the length of the reticulation.

Southern United States.

Victoria, Texas, May, 31 (W. E. Hinds); Cypress Bayou, Texas, August 23, 1903 (J. D. Mitchell); Greenville, Texas, June 30, 1904 (H. S. Barber); Dallas, Texas, June 24, 1904 (H. S. Barber); Westpoint, Mississippi, August 11, 1904 (H. S. Barber); Corinth, Mississippi, August 14, 1904 (H. S. Barber); Jackson, Mississippi, August 8, 1904 (H. S. Barber); Vanburen, Arkansas, July 6, 1904 (H. S. Barber); Fort Smith, Arkansas, July 8, 1904 (H. S. Barber); Little Rock, Arkansas, July 11, 1904 (H. S. Barber); Danville, Arkansas, July 10, 1904 (H. S. Barber); Helena, Arkansas, July 30, 1904 (H. S. Barber); Scott, Arkansas, July 11, 1908 (J. K. Thibault, Jr.); Chattanooga, Tennessee, July 27, 1904 (H. S. Barber); Wister, Indian Territory, July 2, 1904 (H. S. Barber); Woodstock, Virginia, August 4, 1904 (F. C. Pratt); Plummer's Island, Maryland, July 18, 1904 (R. P. Currie); Washington, District of Columbia, July 21, 1909 (T. Pergande). Also recorded from Fort Logan H. Roots, Arkansas (Theobald).

The only male specimen of this species which we have had was dissected by Dr. E. P. Felt and unfortunately destroyed, so that we have been unable to prepare a description of that sex. This species has been generally confused with *Psorophora lutzii*. While it agrees in the central dark stripe of the mesonotum and the tarsal coloration, there are obvious and constant differences between the two.

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PSOROPHORA CHAMPERICO (Dyar & Knab).

Janthinosoma champerico Dyar & Knab, Proc. Biol. Soc. Wash., xix, 134, 1906.
Janthinosoma champerico Theobald, Mon. Culic., v, 603, 1910.

ORIGINAL DESCRIPTION OF JANTHINOSOMA CHAMPERICO:

Hind legs with raised scales; last two joints of hind tarsi white; abdomen all yellow scaled below; else as in *J. lutzii* Theobald.

One specimen, Champerico, Guatemala (F. Knab).

Type.—Cat. No. 9968, U. S. Nat. Mus.

DESCRIPTION OF FEMALE OF PSOROPHORA CHAMPERICO (MALE AND LARVA UNKNOWN):

Female.—Proboscis slender, rather long, uniform, labellæ conical and a little thickened at base; clothed with dense blue-black scales and very small black setæ, those on labellæ more prominently outstanding. Palpi about one-third as long as proboscis, clothed with blue-black scales and rather long bristles. Antennæ slender, rugose, pilose, blackish; second segment yellowish, smooth and slightly thickened on basal two-thirds, slightly longer than the succeeding ones; tori subspherical, with a cup-shaped hollow at tip, pale without, blackish within. Clypeus elliptical, prominent, convex, blackish, nude. Eyes blue black. Occiput roundedly prominent, clothed with broad, curved golden yellow scales, many upright, forked yellow scales on the nape, some very narrow scattered ones before, a patch of flat black ones at middle of each side; coarse blackish bristles along margins of eyes, a tuft of yellow ones projecting at vertex.

Prothoracic lobes rather large, blackish, sparsely clothed with broad, curved golden-yellow scales throughout and numerous blackish bristles. Mesonotum black; a broad median stripe widening posteriorly, rather uniformly clothed with narrow brownish-black scales and rows of sparse, short black bristles; anterior edge narrowly and sides of disk broadly clothed with broad, curved golden-yellow scales and numerous rather short black bristles, a short line of broad, curved golden-yellow scales on each side at base near ante-scutellar bare space. Scutellum trilobate, blackish brown, sparsely clothed with broad golden-yellow scales, each lobe with a group of brown bristles. Postnotum elliptical, prominent, nude, blackish brown with a slight whitish pruinosity. Pleuræ blackish, largely covered by dense, flat, elliptical pale-golden scales. Fore and hind coxæ pale testaceous, with a few pale-golden scales and many pale bristles; mid coxæ blackish, with blue-black scales and black bristles.

Abdomen subcylindrical, posterior segments distinctly tapered; cerci prominently projecting; dorsal vestiture of small violet-black scales, the sides obliquely golden-yellow scaled; first segment clothed dorsally with flattened pale-yellow scales and with many fine pale setæ; venter densely clothed with flat golden-yellow scales, continuously at base, further on with small median patches of blue-black scales at bases of segments, which become larger distally, the seventh segment being almost wholly black below.

Wings rather narrow, the membrane faintly infuscated, more distinctly so towards costa; petiole of second marginal cell but a little shorter than the cell, that of second posterior cell considerably longer than cell; basal cross-vein considerably less than its own length from anterior cross-vein; veins blackish, the scales brown with violet luster, the outstanding ones on apical half of wing broadly linear. Halteres with a pale stem and brownish knob and silvery scales at apex.

Legs long and slender; femora basally yellow, the hind ones clothed with small golden scales to apical fourth, mixed with a few black ones dorsally, the distal part violet-black; knees narrowly white; front and middle femora mostly violet-black scaled; tibiæ and tarsi violet black, vestiture on outer half of posterior tibiæ and on the first three tarsal joints dense and partly erected; last two

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hind tarsal joints and minute tip of third joint white. Claw formula, 1.1–1.1–1.1.

Length: Body about 7.5 mm.; wings 6 mm.

Life history and habits unknown.

Guatemala to Panama.

Champerico, Guatemala, August 3, 1905 (F. Knab); Tabernilla, Canal Zone, Panama, September 3, 1908 (A. H. Jennings).

Psorophora champerico is rare, only two specimens from widely separated localities having come to hand. The species is remarkable for its large size, much exceeding any of the others in the *Janthinosoma* group, and we suspect that the larva will prove to be predaceous.

PSOROPHORA MEXICANUS (Bellardi).

Culex mexicanus Bellardi, Mem. R. Accad. Sci. di Torino, Ser. 2, xix, 205, 1859.
Culex mexicanus Bellardi, Saggio Ditterol. Messic., 1, 5, 1859.
Lepidosia mexicana Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 16, 1906.
Lepidosia mexicanus Theobald, Mon. Culic., v, 627, 1910.

ORIGINAL DESCRIPTION OF CULEX MEXICANUS:

Femm. *Violaceo-fuscus, metallicus. Capite parvulo, subsphaerico; vertice setuloso, setulis nigris; fronte fusca, lata; facie et palpis violaceo-metallicis; antennis fuscis, capite et thorace longioribus, articulis subaequalibus, tomentosis, ad basim longe setulosis; proboscide longa, ad basim fusca, ad apicem nigra; occipite squamoso, squamis flavo-aureis. Thorace fusco-nitido, squamoso, squamis aureis; pleuris et pectore pallidis, maculis fusco-violaceis, nitidis; margine postico scutelli setuloso, setulis nigris in tres penicillos dispositis; halteribus flavis, ad apicem fuscis. Abdomine violaceo, metallico; lateribus abdominis et ventre squamosis, squamis aureis. Pedibus longis, posticis longioribus; femoribus ad basim anticis parum, posterioribus late flavis, ad apicem violaceo-nigris, metallicis; tibiis et tarsis violaceo-nigris, metallicis; ultimo tarsorum posticorum articulo lacteo; tibiis et tarsis posticis dense nigro-tomentosis. Alis fuscis; nervis squamosis, squamis fuscis.*

Lunghezza del corpo * 6 mm.—Lunghezza delle ali distese 11 mm.

Molte sono le specie esotiche di questo genere già conosciute; fra queste hanno maggiore analogia colla presente il *C. posticatus* WIED., *C. longipes* FABR., *C. violaceus* WIED. e *C. splendens* WIED. Il *Culex mexicanus* peraltro si distingue assai facilmente da queste specie per le seguenti sue proprietà: per le squame dorate dell'addome e del ventre dal *C. posticatus* e dal *C. longipes;* per l'ultimo articolo dei tarsi posteriori solamente bianco dal *C. violaceus* e. dal *C. spendens,* imperocchè i piedi del primo non hanno parti bianche, e la base di tutti i tarsi del secondo è bianca.

Messico (SALLÉ).

Collezioni del Museo zoologico di Parigi e BELLARDI.

* Nella lunghezza totale del corpo non si tien conto nè delle antenne, nè della proboscide; la lunghezza data delle ali nota la distanza interposta fra i due apici delle ali, considerando queste come distese e preparate.

DESCRIPTION OF FEMALE OF PSOROPHORA MEXICANUS (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderate, cylindrical, slender, uniform, labellæ conically tapered; vestiture of dark scales with a dark-blue reflection, setæ rather numerous but very small, those on labellæ more prominently outstanding. Palpi over one-fourth as long as proboscis, with blue-black scales and rather short bristles. Antennæ with the segments subequal, coarsely pilose, blackish; second joint a little longer and thicker than the others but similar; tori subspherical, with a cup-shaped apical excavation, blackish, shining; hairs of whorls sparse, rather long, black. Clypeus rather broadly elliptical, convex, shining black, nude. Eyes bronzy black. Occiput narrow, convex, blackish, vestiture of very broad, flat, dull silvery scales, densest along ocular margins, yellowish brown upright-forked ones behind; bristles near ocular margins rather numerous, blackish with pale tips.

Prothoracic lobes moderate, remote, black, clothed with broad, flat silvery scales and numerous brown-tipped bristles. Mesonotum black, rather uniformly

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covered with broad, curved yellowish-silvery scales mixed with grayish ones, more especially in a pair of indistinct submedian longitudinal stripes and a short pair basally at sides of ante-scutellar space; bristles numerous, short, black. Scutellum trilobate, blackish, with broad dull-silvery scales and a group of black bristles on each lobe. Postnotum elliptical, prominent, shining, blackish, nude. Pleuræ black, densely clothed in the middle with flat white scales; coxæ blackish, with patches of white scales.

Abdomen subcylindrical, flattened, posterior segments abruptly tapering; dorsal vestiture of metallic dark violaceous scales, lateral quadrate patches of flat white scales on posterior angles of segments which extend well onto the dorsum; venter with apical segmental white bands, basal portions blue black, the seventh segment entirely black; first segment clothed dorsally with flat white scales and with many pale bristles.

Wings moderate, hyaline with an iridescent reflection; petiole of second marginal cell shorter than its cell, that of second posterior about equal to its cell; basal cross-vein about its own length distant from anterior cross-vein; veins dark brown, scales dull brown, the outstanding ones rather broadly ligulate. Halteres pale, with brownish tips.

Legs moderately long, without any outstanding scales; hind femora largely pale yellowish, a few black scales above, apical fourth blue black, extreme tips white; fore and mid femora nearly wholly blue-black scaled, the knees white; all the tibiæ and tarsi blue black, last joint of hind tarsals white, the penultimate joint white scaled at its base. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 3.5 mm.

Life history and habits unknown.

Mexico.

Tehuantepec, Oaxaca, Mexico, July 5, 1905 (F. Knab); Salina Cruz, Oaxaca, Mexico, July 10, 1905 (F. Knab).

Blanchard thought that *Culex mexicanus* Bellardi was identical with *Culex musicus* Say, and the latter name being preoccupied, applied the name *Janthinosoma mexicanum* to the species we call *sayi* (Les Moust., 234, 1905).

PSOROPHORA PAZOSI (Pazos).

Aëdes pazosi Pazos, Anal. Acad. Cien. Med., fis. y nat. de la Habana, xlv, 432, 1908.
Aëdes pazosi Dyar & Knab, Smiths. Misc. Colls., quart. iss., iii, 253, 1909.
Aëdes pazosi Pazos, San. y Ben., ii, 46, 192, 1909.

ORIGINAL DESCRIPTION OF AËDES PAZOSI:

FEMALE.—Occiput with golden scales. Mesonotum with broad, flat, golden scales. Abdomen dark violet blue above, with lateral triangular apical segmental spots of golden scales, venter golden-scaled. Legs dark violet blue, the scales on the hind tibiæ and tarsi not erect or roughened, last two hind tarsal joints white, the fourth joint marked with black beneath nearly throughout. Wing-scales brown.

One specimen, Vuelta-Abajo, Cuba (J. H. Pazos).

Type no. 12117, U. S. N. M.

Named in honor of the collector, Dr. J. H. Pazos.

DESCRIPTION OF FEMALE AND MALE OF PSOROPHORA PAZOSI (LARVA UNKNOWN):

Female.—Proboscis rather long, uniform, labellæ conically tapered; vestiture black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi moderate, over one-fourth the length of the proboscis, clothed with dark metallic-blue scales and with a few rather short black setæ. Clypeus rounded triangular, prominent, brown, nude. Antennæ slender, with the joints subequal, rugose, pilose, black; second joint somewhat swollen towards base, basal third luteous; hairs of whorls sparse, moderate, black; tori subspherical, with a cup-shaped apical excavation, brownish luteous, dark within. Eyes black. Occiput dark brown in front, luteous posteriorly, clothed anteriorly with broad, flat white scales, medianly and posteriorly with golden scales, a large patch of

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black ones on each side subdorsally; rather small, narrow, truncate, erect and suberect golden-yellow scales on the occiput; a row of black setæ along margins of eyes, a few yellow ones projecting at vertex.

Prothoracic lobes elliptical, remote dorsally, clothed with broad, flat whitish scales and brown bristles. Mesonotum deep brown, clothed with broad flat scales, dark brown and golden yellow nearly evenly intermixed. Scutellum trilobate, brown, clothed with scales similar to those of the mesonotum, each lobe with a group of black bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ dark brown and luteous, densely clothed in the middle with flat silvery-white scales; front and hind coxæ luteous, with patches of broad, flat white scales and rows of brown bristles.

Abdomen subcylindrical, tapering posteriorly, clothed above with submetallic violet-blue scales, apices of segments with lateral triangular large yellow spots reaching anterior borders of segments; first segment clothed dorsally with brownish scales and with many pale setæ; venter entirely yellow scaled with a metallic luster.

Wings rather narrow, slightly infuscated, particularly towards the costa and along basal portion of fourth vein; petiole of second marginal cell more than half as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales of veins blackish, those on costa with a blue reflection, outstanding ones narrowly lanceolate, densest on forks of second vein. Halteres pale, with darker white-scaled knobs.

Legs rather long, vestiture dark violet blue; front and hind femora yellow at bases and beneath nearly to tips; mid femora blue scaled to base; knees silvery-white scaled; tibiæ and tarsi entirely smooth, blue black, last two joints of the hind tarsi white above, fourth joint black-marked beneath in an interrupted stripe, the black forming a very narrow apical ring at tip of joint. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis straight, slender, slightly thickened at apex. Palpi long, exceeding the proboscis by nearly the length of the last two joints; end of long joint and last two joints somewhat thickened and bearing long blackish hairs; vestiture blue-black, a rather broad white ring devoid of scales at the false articulation before middle of long joint. Antennæ plumose; last two joints blackish, ciliate, the others short, whitish, with blackish rings at insertions of the hair-whorls; hairs of whorls long, moderately dense, black. Coloration similar to the female. Wings narrower than in the female, the fork-cells shorter, the vestiture sparser. Claw formula, 2.1–2.1–1.1.

Length: Body about 4 mm.; wing, 3.5 mm.

Genitalia (plate 21, fig. 148): Side-pieces about twice as long as wide, the tips conically tapered; clasp-filament broadly expanded in the middle, a short, stout, inserted terminal spine. Harpes concave, with revolute margins, the tips pointed and bent. Harpagones long, far exceeding the harpes, their tips narrowly expanded, bearing a row of stout setæ and two terminal filaments, one disk-shaped, the other curled. Unci forming a long-pointed basal cone.

Life history and habits unknown.

Cuba.

San Cristobal (J. H. Pazos); Vuelta-Abajo (J. H. Pazos).

We have been obliged to credit the authorship of this species to Dr. Pazos, since he published a photograph of it, together with the manuscript name, which had been sent him, in advance of the appearance of the description by Dyar and Knab. The general coloration is very similar to *Psorophora sayi*, but the absence of suberect scales from the hind tibiæ and tarsi will at once distinguish it.

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PSOROPHORA CYANESCENS (Coquillett).

Culex cyanescens Coquillett, Journ. N. Y. Ent. Soc., x, 137, 1902.
Feltidia cyanescens Dyar, Journ. N. Y. Ent. Soc., xiii, 55, 1905.
Feltidia cyanescens Dyar, Proc. Ent. Soc. Wash., vii, 47, 1905.
Lepidosia cyanescens Coquillett, Science, n. s., xxiii, 314, 1906.
Lepidosia cyanescens Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 16, 1906.
Aëdes cyanescens Thibault, Proc. Ent. Soc. Wash., xii, 17, 1910.
Lepidosia cyanescens Theobald, Mon. Culic., v, 627, 1910.

ORIGINAL DESCRIPTION OF CULEX CYANESCENS:

Black, the stems of the halteres and the femora except their apices, yellow; occiput rather densely covered with broad, appressed, yellow scales and narrow, upright, yellow ones changing to black at the sides and posterior edge, a spot of violet blue appressed scales near middle of each outer edge of the occiput; palpi covered with broad, appressed, violet blue scales; mesonotum and scutellum rather densely covered with broad, appressed, brassy yellow scales, the pleura with whitish ones; abdomen densely covered with deep blue scales, the posterior angles of each segment, whole of the first and of the venter covered with brassy yellow scales, the spots at the posterior angles of the segments considerably produced forward at their inner ends; scales at apices of femora, on hind tibiae and front side of the others, also on tarsi, violet blue; tarsal claws large, one-toothed; wings grayish hyaline, veins chiefly blue, lateral scales narrow and elongate, petiole of first submarginal cell four-fifths as long as the cell, posterior cross-vein about its own length from the small; length, 4 to 5.5 mm.

Habitat: Brownsville, Texas.
Type: Cat. No. 6308, U. S. N. M.
Six females collected in May and on June 4.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF PSOROPHORA CYANESCENS:

Female.—Proboscis moderate, cylindrical, slender, uniform; labellæ stout and rather long; vestiture of dense blue-black scales, setæ curved and very small, those on labellæ prominently outstanding. Palpi rather more than one-fourth the length of the proboscis, stout, clothed with metallic blue-black scales, the setæ small. Antennæ rather stout; joints subequal, rugose, black, densely pale pilose, second joint dull luteous, slightly swollen; tori brown, with a patch of whitish scales on inner side; hairs of whorls short and sparse. Clypeus elliptical, prominent, shining blackish, nude. Eyes black. Occiput blackish, short, convex, clothed with broad, curved soiled-whitish scales, a patch of dark violet ones at the sides, some yellowish, narrow, erect forked ones behind; bristles near ocular margins rather short, black, some whitish ones projecting at vertex.

Prothoracic lobes moderate, brown, clothed with broad, curved soiled-silvery scales and rather numerous short dark bristles. Mesonotum black, vestiture of dense, broad curved soiled-silvery scales intermixed with some narrower brown ones with slight blue reflection, especially on center of disk but not forming any defined pattern; no bare stripes; bristles numerous, short, blackish. Scutellum trilobate, blackish, each lobe with a few soiled-silvery scales and with about ten pale bristles. Postnotum elliptical, convex, black with a dull pruinosity, nude. Pleuræ blackish, rather densely clothed with broadly elliptical sordid white scales; coxæ luteous, with whitish scales and black bristles.

Abdomen subcylindrical, posterior segments distinctly tapering, dorsum depressed; vestiture dorsally of dark metallic violet-blue scales, with pale-golden, broad apical bands, narrowed towards the sides, interrupted in the middle on all but the first two segments; at the sides the bands are produced forward and become confluent along sides of basal segments; venter yellowish-white scaled, the seventh segment dark violaceous.

Wings rather broad, hyaline with a slight smoky tinge along anterior border, the membrane with an iridescent reflection; petiole of second marginal cell about as long as its cell, that of second posterior cell somewhat longer; basal cross-vein much less than its own length distant from anterior cross-vein; veins

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dark brown; scales black, the outstanding ones broadly linear and ligulate. Halteres pale, with blackish knobs, a patch of white scales at tips.

Legs moderately long, a few scales at apices of posterior tibiæ obliquely outstanding; femora yellow, with small golden scales, a line on upper side and an apical ring of blue-black scales; knees very narrowly silvery-white scaled; tibiæ and tarsi entirely clothed with appressed blue-black scales and short, stiff black bristles. Claw formula, 1.1–1.1–1.1.

Length: Body about 5 mm.; wing, 4 mm.

Male.—Proboscis straight, slender. Palpi long, exceeding the proboscis by nearly the length of the last two joints, which are both stout and swollen; membrane blackish, vestiture entirely of metallic violaceous scales, apex of long joint and last two joints with many long black hairs. Antennæ plumose; last two joints long and pilose, the others short, pale, with broad dark rings at insertions of the hair-whorls; hairs of whorls long, dense, brown. Coloration similar to the female. Abdomen elongate, depressed, with long and abundant black lateral ciliation. Hind tibiæ with rather sparse long and prominently outstanding scales; many long hairs on femora, tibiæ, and tarsi. Wings narrower than in the female, without brownish costal tinge, the veins paler brown, the stems of the fork-cells longer. Claw formula, 2.1–2.1–1.1.

Length: Body 6 mm.; wing 5 mm.

Genitalia (plate 22, fig. 158): Side-pieces with conical tips, rather more than twice as long as broad, without apical or basal lobes. Clasp-filament swollen beyond middle, the enlargement on the inner side, marked in a reticulate pattern and fringed on inner aspect with minute setæ and short denticles; a rather long terminal articulated spine. Harpes laminate, elliptical, outer margins thickened and revolute with several small apical dentations. Harpagones long, with a slender ligulate base and expanded fan-shaped tip bearing a row of eight stout setæ from produced bases. Unci approximate at tips, elliptical, flat, both margins revolute, a group of small spines below base of side-pieces on either side.

Larva, Stage IV (plate 116, fig. 400).—Head rounded, transverse, somewhat elliptical, not widened through eyes; antennæ large, stout, minutely densely spined, a two-haired tuft near middle, terminal setæ short; dorsal head-hairs single, ante-antennal tufts in threes. Lateral comb of eighth segment of four large scales on a weak chitinous plate, each scale broad, with spines at corners and a long central spine. Air-tube inflated, fusiform, with three separated pecten teeth near base; a long hair on each side at tip arising from lateral respiratory flap. Anal segment a little longer than wide, ringed by a chitinous band; dorsal tufts of a long hair and tuft on each side; ventral brush continued along ventral line nearly to base. Anal gills long, equal, pointed.

The eggs are black and laid singly, according to the observations of Mr. W. E. Hinds. The larvæ develop in temporary puddles immediately after rains. Mr. Thibault gives the following account of the adults:

"Very abundant in suitable localities after rains, in fields, thickets, and about dwellings. Does not enter dwellings. The appearance of this mosquito immediately after rains is so strikingly characteristic that even people who never pay much attention to such things notice it. They are out in force for several days after a rain and then only a few will be found until the next rain.

"The most annoying of all mosquitoes when occurring abundantly, not only to human beings, but to all kinds of stock. They are very persistent and hard to kill unless you hit them a real hard blow. The only mosquito, so far as I know, that will at all times come out into the sunshine on the very hottest days and bite. They gorge themselves until they literally fall to the ground, almost unable to fly at all. They never *voluntarily* quit biting, but stay in the same place for hours (on horses especially) until literally pulled off. In this way

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they travel for miles on horses and cattle. In September of this year they made cotton picking and road work impossible in places here. They stay in grass and bushes and as soon as these are disturbed they sally forth in swarms. I have sat quietly for an hour where I knew them to be abundant and scarcely saw one, but when I would get up and walk around and shake up the grass and bushes and then sit down again they would immediately cover me. This is partly true of all the out-of-doors mosquitoes. Abundant at intervals from last of May till October."

Southwestern United States, western Mexico and Yucatan, northern Colombia, principally in dry regions.

Wellington, Kansas, May, 1908 (E. O. G. Kelly); Fort Smith, Arkansas, July 8, 1904 (H. S. Barber); Vanburen, Arkansas, July 6, 1904 (H. S. Barber); Scott, Arkansas, July 17, 1908 (J. K. Thibault, Jr.); Shreveport, Louisiana, June 23, 1905 (H. A. Morgan); Roosevelt, Texas, September 16, 1906 (F. C. Pratt); Clarkeville, Texas, August 29, 1905 (P. R. Jones); Dallas, Texas, August 31, 1906 (F. C. Pratt); Austin, Texas, August 8, 1903 (A. W. Morrill); Hetty, Texas, July 10, 1904 (F. C. Bishopp); Paris, Texas, June 17, 1907 (F. C. Bishopp); Cotulla, Texas, April 15, 1907 (F. C. Pratt); Victoria, Texas, September 14, 1903 (W. E. Hinds); Dallas, Texas, May 12, 1906 (A. W. Morrill); Brownsville, Texas, May 13, 1904 (H. S. Barber); Nautla, State of Jalisco, Mexico (A. Dugès); Salina Cruz, State of Oaxaca, Mexico, July 9, 1905 (F. Knab); Tehuantepec, State of Oaxaca, Mexico, June 29, 1905 (F. Knab); Yucatan, Mexico (A. L. Herrera); Santa Marta, Colombia (J. H. Egbert).

PSOROPHORA DISCRUCIANS (Walker).

Culex discrucians Walker, Ins. Saund., 430, 1856.
Janthinosoma discrucians Arribálzaga, Rev. Mus. de La Plata, ii, 153, 1891.
Culex discrucians Giles (in part), Gnats or Mosq., 277, 1900.
Culex discrucians Theobald, Mon. Culic., i, 258, 1901.
Janthinosoma arribalzagae Giles, Gnats or Mosq., 2 ed., 339, 341, 1902.
Janthinosoma arribalzagae Theobald, Mon. Culic., iii, 128, 1903.
Conchyliastes varipes Coquillett, Can. Ent., xxxvi, 10, 1904.
Janthinosoma arribalzagae Lutz, in Bourroul, Mosq. do Brasil, 71, 1904.
Ianthinosoma arribalzagai Blanchard, Les Moust., 235, 1905.
Ianthinosoma varipes Blanchard, Les Moustiques, 626, 1905.
Janthinosoma varipes Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 181, 1906.
Janthinosoma varipes Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 3, 1906.
Janthinosoma discrucians Dyar & Knab, Proc. Biol. Soc. Wash., xix, 134, 1906.
Janthinosoma discrucians Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 17, 1906.
Janthinosoma varipes Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 17, 1906.
Ianthinosoma arribalzagae Autran, Anal. Dep. Nac. Hig., xiv, 14, 1907.
Janthinosoma discrucians Theobald, Mon. Culic., iv, 158, 1907.
Janthinosoma varipes Theobald (in part), Mon. Culic., iv, 154, 1907.
Culex (*Janthinosoma*) *varipes* Viereck, First Rept. Comm. Health Pa., 471, 1908.
Janthinosoma arribalzagae Peryassú, Os Culic. do Brazil, 62, 1908.
Janthinosoma discrucians Peryassú, Os Culic. do Brazil, 43, 154, 1908.
Aëdes discrucians Thibault, Proc. Ent. Soc. Wash., xii, 17, 1910.
Janthinosoma discrucians Theobald, Mon. Culic., v, 120, 1910.
Janthinosoma varipes Theobald (in part), Mon. Culic., v, 121, 1910.

ORIGINAL DESCRIPTION OF CULEX DISCRUCIANS:

Nigricans; pectus argenteum; abdomen purpureum, subtus testaceo fasciatum; pedes purpurei, femoribus testaceis, genubus albo guttatis, tarsis fascia subapicali alba; alae subcinereae, venis fuscis subciliatis; halteres testacei, apice fusci. Mas.—*Antennae testaceo fasciatae.*

Blackish. Proboscis long, slender. Pectus silvery whitish. Abdomen purple, with testaceous bands beneath. Legs purple, long, slender; femora testaceous, purplish towards the tips; a white dot on each knee; tarsi with a white subapical band. Wings grayish; veins brown, slightly ciliated. Halteres testaceous, with brown tips.

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Male.—Proboscis rather longer than the antennæ. Palpi much longer than the proboscis. Antennæ with testaceous bands. Length of the body 3 lines; of the wings, 5 lines.

South America.

ORIGINAL DESCRIPTION OF JANTHINOSOMA ARRIBÁLZAGÆ:

Wings unspotted, densely black-scaled; unusually wide in proportion to their length. Tarsi uniformly black-scaled, with the exception of a broad basal white band on the fourth joint of the hind legs. Thorax sooty, clothed on the mesonotum and scutellum, with short falciform, golden scales with numerous long stiff black bristles on their margins. Abdomen, deep amethystine purple, with triangular apical golden spots on each segment, and some yellow scales and hairs along the hind border of the first; ventrally, the segments show triangular golden apical markings.

There can be little doubt that it was upon this species that Arribálzaga founded his new genus, as it agrees entirely with his description, given below, while specimens, sent to Mr. Theobald by Dr. Lutz, and which correspond to Walker's type of *C. discrucians*, though believed by the latter naturalist to be Arribálzaga's species, were at once seen to fail to correspond with Arribálzaga's description and figure, and it is obviously unlikely that the discrepancies can be due to careless drawing. This difficulty is now set at rest by a specimen I have just received from Dr. Lutz, labelled "*Janthinosoma*, sp. n.," and which was at once recognized by Mr. Theobald as the missing species.

The head and appendages almost black, the vertex and nape clothed with erect forked, and short falciform golden scales. The pleurae and coxae show extensive areas of golden scales and the lower surfaces of the femora, and the base also above of those of the hind legs, are bright golden, the apices of the femora showing also a barely noticeable yellow knee-spot.

This species can be easily distinguished from any other of the genus by the single band on the hind tarsi.

ORIGINAL DESCRIPTION OF CONCHYLIASTES VARIPES:

Near *musicus*, but the last joint of the hind tarsi is brown. Black, the front and hind femora, except their broad apices, the posterior side of the middle femora except their apices, and the stems of the halteres, yellow, the fourth joint of the hind tarsi white; scales of palpi violaceous, those of the occiput yellowish white and with a patch of violaceous ones on either side; (mesonotum abraded; what scales remain are yellowish white and a few black ones along the middle); scales of abdomen violet blue, those on sides of first two segments, hind angles of the others except the last one, under surface of each segment except the last one and base of the preceding, whitish; scales on yellow portion of femora yellowish white, those on the remainder and on tibiae violet blue, those on the tarsi black except on the fourth joint of the hind tarsi, where they are white, claws of front tarsi toothed; wings grayish hyaline, veins and scales brown, petiole of first submarginal cell from two-fifths to three-fifths as long as that cell, hind cross vein less than its length from the small; length, 4 mm. Five female specimens. Type No. 7341, U. S. N. M.

Las Penas and Tonala, Mexico (Dr. A. Dugès), and Agricultural College, Mississippi (May 18, Glenn W. Herrick).

DESCRIPTION OF FEMALE, LARVA, AND EGG OF PSOROPHORA DISCRUCIANS (MALE UNKNOWN):

Female.—Proboscis moderate, slender, uniform, labellæ conically tapered; vestiture of blue-black scales, setæ very small, black, curved, those on labellæ small, prominently outstanding. Palpi about one-fourth as long as proboscis, thick, uniform, clothed with violaceous scales and with rather small black setæ. Antennæ slender, the joints subequal, pilose, blackish, rugose; second joint a little longer and stouter; tori subglobose, with a cup-shaped apical excavation, blackish, shining, a patch of broad whitish scales on inner side; hairs of whorls moderate, sparse, black. Clypeus elliptical, shining, black, nude. Eyes bronzy brown. Occiput short, convex, black, clothed with flat, broadly lanceolate scales, silvery anteriorly in the middle and below, yellowish posteriorly, a large patch of dark blue ones on each side, a number of brownish or luteous erect, forked scales on the nape; setæ rather small, black.

Prothoracic lobes prominent, black, remote, with a number of flat sordid-silvery scales and black setæ. Mesonotum black, clothed with narrowly lanceo-

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late brownish-black scales in a broad longitudinal stripe, a broad band of very broad silvery scales along sides of disk, ante-scutellar bare space surrounded by broad yellowish-silvery scales, prolonged forward in an indistinct median line; bristles rather numerous, short, black. Scutellum trilobate, each lobe with a patch of yellowish-silvery scales and a group of black bristles. Postnotum elliptical, prominent, blackish brown, nude, shining. Pleuræ blackish, clothed with elliptical, flat white scales; coxæ paler, with patches of white scales and rows of black bristles.

Abdomen subcylindrical, flattened, the distal segments strongly tapering; dorsal vestiture of black scales with a dark violet-blue reflection, with lateral spots of yellowish-white scales on posterior angles of segments, small and quadrate in dorsal view, large and triangular in ventral view; venter with broad, apical yellowish-white segmental bands, the basal halves of the segments blue black, the last segment entirely black, with pale scales at margins; first segment dorsally clothed with yellowish-white broad scales and with many rather fine pale setæ; setæ rather short, black, more numerous at ends of segments.

Wings moderate, membrane faintly infuscated; petiole of second marginal cell about half as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein nearly its own length distant from anterior cross-vein; veins brown; scales black with a blue reflection, especially on costa, outstanding ones broadly linear or ligulate, denser on outer part of wing. Halteres soiled whitish, with dark tips bearing some white scales.

Legs rather long, moderately stout, ends of tibiæ and basal tarsal joints, more especially of hind legs, appearing thickened by long roughened scales; femora pale at base and beneath with small pale-yellow scales, tips broadly ringed with blue black, middle pair blue-black scaled to base; knees white scaled; tibiæ and tarsi clothed with blue-black scales, except the penultimate joint of hind tarsi which is white scaled. Claw formula, 1.1–1.1–1.1.

Length: Body about 4 mm.; wing 3.5 mm.

Larva, Stage IV (plate 115, fig. 391).—Head rounded, wider than long, narrowed before eyes, a slight notch at insertion of antennæ, front margin broadly arcuate. Antennæ very long, as long as head, slender, a little swollen toward base, spined all over; a large tuft of long branched hairs a little before the middle; three long spines and two small digits at tip. Eyes large, transverse, pointed. Both pairs of dorsal head-tufts double, ante-antennal tuft multiple. Mental plate triangular, with a large central tooth and twelve on each side, rather small, alike, closely set. Mandible quadrangular, incised without at middle, smooth; two long filaments before tip; an outer row of stout cilia; outer edge roughened but hairless; dentition of four teeth on a process, first and fourth longer; a filament without, a large and two small teeth at base, a serrate filament within; process below simple, with patches of hair; a short process below it; four long hairs at base within; four stout hairs at base. Maxilla elongate hemispherical, divided by a narrow suture; inner half spined; a row of long cilia on suture at tip; outer half with some hairs at base, smooth toward palpus; a filament at suture on each side. Palpus small, nearly square, with four very small digits. Thorax rounded, wider than long, robust; hairs abundant but not long. Abdomen stout, anterior segment shorter; lateral hairs multiple on first segment, double on second, single on third to sixth. Tracheal tubes broad, band-shaped, irregularly flexuous posteriorly. Air-tube large, strongly inflated, tapered on outer half, three times as long as wide; pecten of five teeth scattered over basal half of tube; single tooth with broad base, a long spine at one end, three subbasal ones, the middle one longest. Lateral comb of eighth segment of five or six scales in a row, upper and lower scales small; single scale with a

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rectangular rounded base, long central spine, conical, pointed, and a shorter but similar one on each side. Anal segment much longer than wide, ringed by the plate; dorsal tuft a long hair and brush on each side; a small lateral tuft; ventral brush well developed, extending along ventral line to near base. Anal gills long, longer than the segment, tapered to a sharp tip; each with a single central trachea.

Egg.—Pointed-fusiform, flattened on one side, rather long and narrow; sculpture of elongate hexagonal reticulations, from micropylar end of each there arises a recumbent, stout blunt spine, two-thirds the length of the reticulation; a square gelatinous cushion at micropyle.

The larvæ live in ground-pools. Mr. Knab bred a specimen from a larva in a cacao-husk. We have no special information about the habits which are said by Thibault to be similar to those of *Psorophora sayi*.

Southern United States, through Mexico and Central America to South America, especially in dry regions.

Augusta, Georgia, August 10, 1909 (W. V. Reed); Wister, Indian Territory, July 7, 1904 (H. S. Barber); Scott, Arkansas, September 1, 1908 (J. K. Thibault, Jr.); Clarksdale, Mississippi, August 1, 1904 (H. S. Barber); Natchez, Mississippi, May 8, 1907 (A. Fleming); Belzona, Mississippi, August 4, 1904 (H. S. Barber); Tutwiler, Mississippi, August 2, 1904 (H. S. Barber); Westpoint, Mississippi, August 11, 1904 (H. S. Barber); Agricultural College, Mississippi, May 18, 1901 (G. W. Herrick); Las Peñas, State of Jalisco, Mexico, July 14, 1903 (A. Dugès); Coatzacoalcos, Mexico (A. Dugès); Tehuantepec, Mexico, July 2, 1905 (F. Knab); Salina Cruz, Mexico, July 10, 1905 (F. Knab); Champerico, Guatemala, August 4, 1905 (F. Knab); Ceiba, Honduras (D. P. Albers); Puerto Barrios, Honduras (D. P. Albers); Port Limon, Costa Rica, September 28, 1905 (F. Knab); São Paulo, Brazil (A. Lutz). Reported also from Trinidad (Theobald); Ladario, State of Matto Grosso, Juiz de Fora, State of Minas Geraes, Rio de Janeiro, Taubaté and Santos, State of São Paulo, Brazil (Peryassú); Las Conchas, Zárate and Baradero, Province of Buenos Aires, Formosa, Chaco Territory, Argentine Republic (Arribálzaga).

The types of *varipes* are in poor condition, so that the author of that name considered them to represent a different species from *discrucians*, namely one without a median stripe of dark scales on the mesonotum, although he notes the presence of a few dark scales in his original description. The species as defined is, therefore, fictitious, no such species occurring upon the mainland of North America. The species in the Antilles that do have such a coloration, can not be cited as *varipes* since no specimens from that region are cited by Coquillett among his types, or were before him at the time. The specimens from the Bahamas so labeled by him in the U. S. National Museum collection were received subsequently to the publication of the description.

PSOROPHORA JOHNSTONII (Grabham).

Janthinosoma johnstonii Grabham, Can. Ent., xxxvii, 410, 1905.
Janthinosoma schwarzi Dyar & Knab, Proc. Biol. Soc. Wash., xix, 135, 1906.
Janthinosoma varipes Coquillett (in part, not Coquillett), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 17, 1906.
Janthinosoma varipes Theobald (in part, not Coquillett), Mon. Culic., iv, 154, 1907.
Aëdes schwarzi Pazos, San. y Ben., ii, 46, 317, 1909.
Janthinosoma varipes Pazos (not Coquillett), San. y Ben., ii, 51, 680, 1909.
Janthinosoma varipes Theobald (in part, not Coquillett), Mon. Culic., v, 121, 1910.
Janthinosoma schwarzi Theobald, Mon. Culic., v, 604, 1910.

ORIGINAL DESCRIPTION OF JANTHINOSOMA JOHNSTONII:

Head covered with broad pale yellow and violet spindle-shaped scales; a cluster of black bristles between the eyes; a group of upright black forked scales at the back of the head. Eyes deep reddish-purple, bordered posteriorly by a row of white

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scales. Proboscis and palpi black, covered with black scales with violet reflections. Clypeus black. Prothoracic lobes with white scales and long black bristles. Mesothorax covered with creamy white spindle-shaped scales on a black background; scales arranged more thickly on the lateral areas; a number of black bristles scattered over the mesothorax, especially abundant on the postero-lateral areas. Pleura with silvery scales and golden hairs. Scutellum with white scales and a median and two lateral groups of numerous long black bristles. Metathorax black.

Abdomen violet, basal segment with pearly-white scales and golden bristles; next five segments with lateral apical white-scaled areas; numerous black hairs scattered over the segments. Venter white scaled, with narrow basal bands of violet scales. Legs with metallic violet reflections, base and most of the venter of femora yellow scaled; knee spot white, small; third hind tarsus completely white except a few apical black bristles. Ungues all equal and uniserrate. Wings with the first submarginal cell a little longer and nearly as broad as the second posterior cell, its stem the same length as the cell; stem of the second posterior about as long as the cell; halteres with stem and knob pale yellow. Length 4.5 mm.

Observations.—Described from four ♀'s taken on a horse at the foot of the Red Hills, 5 1/2 miles along the Molynes Road, Kingston, Jamaica, early in July, 1905. Found in association with the brilliant *J. discrucians*, Walker. It is apparently closely allied to *J. Arribalzagæ*, Giles, from which it may be distinguished by its wing venation, scutellar bristles and white third hind tarsus.

ORIGINAL DESCRIPTION OF JANTHINOSOMA SCHWARZI:

As in *J. coffini* Dyar & Knab, but the tips of the hind femora are pure white.
One specimen, Cayamas, Cuba, May 7 (E. A. Schwarz).
Type.—Cat. No. 9970, U. S. Nat. Mus.

DESCRIPTION OF FEMALE OF PSOROPHORA JOHNSTONII (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderate, rather slender, straight, cylindrical, uniform, labellæ conically tapered; vestiture of dense black scales with a bluish luster; setæ very small, those on labellæ more prominently outstanding. Palpi nearly one-fourth as long as the proboscis, clothed with glossy black scales and a few black bristles. Antennæ slender, the segments subequal, rugose, ciliate, black; second joint somewhat longer and thicker, pale at base; tori subspherical, with a cup-shaped apical hollow, blackish, a patch of white scales on inner side and a small one without; hairs of whorls sparse, black. Clypeus elliptical, prominent, black, shining, nude. Occiput convex, black, clothed with broad, curved yellowish-white scales and some erect, forked luteous ones which become very numerous at nape, a blue spot at the side; bristles along margins of eyes mostly short, black, some pale ones projecting at vertex.

Prothoracic lobes prominent, remote, black, clothed with yellowish-white scales and short black bristles. Mesonotum black, clothed with elliptical yellow-white scales which are dense and uniform along sides of disk but on dorsum are mixed with narrow, curved black ones, although not forming a defined pattern; setæ numerous, short, black. Scutellum trilobate, black above, pale on posterior side, clothed with elliptical yellowish-white scales and about eight black bristles on each lobe. Postnotum elliptical, black, prominent, nude. Pleuræ black, clothed with elliptical white scales and a few pale bristles; coxæ similarly colored and clothed.

Abdomen subcylindrical, flattened, the distal segments strongly tapering; dorsal vestiture of flat black scales with a blue luster and rather large quadrate patches of creamy white scales on posterior lateral angles of segments, expanded beneath into broad longitudinal stripes; first segment clothed with broadly elliptical white scales and with many pale hairs; venter almost wholly clothed with yellow-white scales, the seventh segment with a large blue spot at base.

Wings moderate, membrane hyaline with a slight smoky tint and iridescent reflection; petiole of second marginal cell shorter than its cell, that of second posterior cell equal to its cell; basal cross-vein less than its own length distant from anterior cross-vein; veins brown; scales blue black, the outstanding ones

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broadly linear or ligulate, those on fork of second vein denser and slightly broader. Halteres pale, with dark tips and some pale scales at apex.

Legs rather long, moderately stout, posterior tibiæ and first tarsal joints slightly thickened by some obliquely outstanding scales; femora clothed with small, flat yellowish white scales basally, upper side beyond base and apical fourth clothed with black scales with a bright blue luster, the middle pair dark scaled nearly to base; tips of middle and posterior femora rather broadly white scaled; tibiæ and tarsi black with a bright blue luster; penultimate joint of hind tarsi white except at its tip. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 3.5 mm.

Life history and habits unknown.

Jamaica and Cuba, West Indies.

Cayamas, Cuba, May 3 (E. A. Schwarz). Also recorded from Jamaica (Dr. Grabham).

Psorophora johnstonii agrees with the description of *Janthinosoma arribalzagæ* Giles, which is a synonym of *P. discrucians*. Giles defines his species as having an "unadorned thorax," *i. e.*, the mesonotum without a central stripe of black scales. However, this is an error, due to the poor condition of Arribálzaga's specimen, Giles's species being based upon the description and figure of that author.

PSOROPHORA COFFINI (Dyar & Knab).

Janthinosoma varipes **Coffin (not Coquillett), in Shattuck, The Bahama Ids., 281, 1905.**

Culex cyanescens **Coffin (not Coquillett), in Shattuck, The Bahama Ids., 283, 1905.**
Janthinosoma coffini **Dyar & Knab, Proc. Biol. Soc. Wash., xix, 134, 1906.**
Janthinosoma coffini **Theobald, Mon. Culic., v, 603, 1910.**

Original Description of Janthinosoma coffini:

Hind legs without raised scales; tarsi without pale basal bands; penultimate joint of hind tarsi white, the last dark; thorax all yellow scaled above; tips of mid and hind femora dusky. Agrees with the description of *J. varipes* Coquillett, but a careful examination of the types of that species shows there to be dark scales on the center of the thorax and that it is a synonym of *J. discrucians* Walker, as identified by Coquillett.

8 specimens, Nassau, Bahamas, B. W. I., June 22, 1903 (T. H. Coffin).

***Type.*—Cat. No. 9969, U. S. Nat. Mus.**

Description of Female of Psorophora coffini (Male and Larva Unknown):

Female.—Proboscis cylindrical, uniform, slender, labellæ conically tapered; vestiture of dense black scales with a blue luster; setæ very small, those on labellæ more prominently outstanding. Palpi about one-fourth as long as proboscis, thick, densely clothed with blue-black scales, with a few long black setæ. Antennæ moderate; joints subequal, blackish, rugose, pilose; tori subspherical, with a cup-shaped hollow at tip, blackish, and a patch of white scales on inner side; hairs of whorls sparse, moderate, black. Clypeus elliptical, prominent, blackish, nude. Eyes black. Occiput convex, black, clothed with rather broadly elliptical sordid-white scales and many erect, forked ochraceous ones, especially posteriorly, a small patch of black scales on sides next eye; bristles small, blackish, some short pale yellowish ones projecting at vertex.

Prothoracic lobes moderate, remote, blackish, clothed with broad, curved, sordid yellowish-white scales and blackish bristles. Mesonotum black, rather evenly covered with broad, curved yellowish-white scales intermixed on disk with some narrower blackish ones not forming a distinct stripe; bristles short, black, rather numerous. Scutellum trilobate, black, clothed with yellowish-white scales and about eight black bristles on each lobe. Postnotum elliptical, blackish, nude. Pleuræ clothed with flat white scales which pass continuously into the light-colored scales on disk of thorax; coxæ pale brown, with a few white scales and rows of blackish bristles.

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Abdomen subcylindrical, flattened, posterior segments strongly tapered; dorsal vestiture of metallic blue-black scales, with large, subquadrate, posterior, lateral segmentary patches of creamy white ones joined beneath into longitudinal stripes; first segment entirely white scaled and with many pale setæ; venter clothed entirely with flat yellowish-white scales, except the seventh segment, which is blue black beneath.

Wings rather broad, hyaline; petiole of second marginal cell a little shorter than its cell, that of second posterior cell about equal to its cell; basal cross-vein distant about its own length from anterior cross-vein; veins brown; scales black, outstanding ones on outer half of wing broadly linear. Halteres yellowish white, with white scales at tips.

Legs moderately long; femora pale, especially beneath, clothed with yellowish-white scales, the tips blue black, middle pair dark scaled above to base; knees dusky scaled; posterior tibiæ and first tarsal joint with a few obliquely outstanding scales; tibiæ and tarsi blue black, except penultimate joint of hind tarsi, which is white on basal two-thirds in the type; other specimens have a varying amount of white, one having nearly the whole joint white, while in one the white is wanting, the hind tarsi being entirely black. Claw formula, 1.1–1.1–1.1.

Length: Body about 3.5 mm.; wing 3 mm.

Life history and habits unknown.

Bahama Islands.

Nassau, New Providence, June 22, 1903 (T. H. Coffin); Lake Cunningham, New Providence, February 15, 1915 (H. G. Dyar); Current Settlement, Eleuthera, June 22, 1903 (T. H. Coffin); Tarpum Bay, Eleuthera, 1903 (T. H. Coffin).

Psorophora coffini was identified by Coquillett as his *Conchyliastes varipes;* this latter has proved to be a synonym of *Psorophora discrucians* Walker. *Psorophora coffini* comes nearest to *P. johnstonii* Grabham, differing by its smaller size, more slender legs with smoother scaling of the hind pair, and minor colorational differences. The *Culex cyanescens* recorded by Coffin from Tarpum Bay is a specimen of this species in which the white of the hind tarsi is obsolete.

PSOROPHORA SIGNIPENNIS (Coquillett).

Tæniorhynchus signipennis Coquillett, Proc. Ent. Soc. Wash., vi, 167, 1904.
Tæniorhynchus signipennis Dyar, Journ. N. Y. Ent. Soc., xii, 244, 1904.
Feltidia signipennis Dyar, Journ. N. Y. Ent. Soc., xiii, 55, 1905.
Feltidia signipennis Dyar, Proc. Ent. Soc. Wash., vii, 47, 1905.
Tæniorhynchus signipennis Blanchard, Les Moust., 631, 1905.
Janthinosoma signipennis Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 183, 1906.
Grabhamia signipennis Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.
Tæniorhynchus* (? *Culex*) *signipennis Theobald, Mon. Culic., v, 432, 1910.

ORIGINAL DESCRIPTION OF TÆNIORHYNCHUS SIGNIPENNIS:

Distinguished by the apical half of the costa of each wing being covered with light yellow scales with the exception of two patches of black ones.

♀.—Brown, varied with yellowish, the bases of the antennæ, a broad band at middle of the proboscis, the first tarsal joint except the apex and a ring near the base, also the bases of the following joints, very narrowly on the last two, yellow. Scales of palpi and the upright ones on the occiput mixed black and light yellow, the appressed scales of the occiput and mesonotum light yellow, those on the abdomen chiefly white, on the femora and tibiæ mixed black and light yellow, not forming distinct bands or spots, those on the tarsi black except at bases of the joints and the broad median portion of the first, which are chiefly whitish; on the second joint of the hind tarsi the whitish scales cover its basal half; tarsal claws not toothed. Wing-scales mixed black and light yellow, the former collected into three spots, two on the apical half of the costa and one on the sixth vein at a point near three-fourths of its length; scales on apical half of the costa and of the sixth vein wholly yellow with the exception of the patches of black scales; of the latter, the first one on the costa is slightly longer than the second and equals about one-half of the yellow in-

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terval between them; lateral scales of the veins varying from broadly oblanceolate to very narrow, almost linear; petiole of the first submarginal cell slightly longer than the cell; hind cross-vein nearly its own length before the small. Length 3 mm.

♂.—Palpi slender, brown, bases of last two joints and the preceding joint except its apex yellow; proboscis reaching slightly beyond base of penultimate joint of palpi; hairs of antennæ golden yellow, many on the lower side brown. Scales of abdomen mixed brown and whitish. Front and middle tarsi bearing two teeth under one of the claws and one under the other, hind tarsal claws not toothed. Length 4 mm. Otherwise as in the female.

Monterey, Mexico. One female and four males (the latter much abraded), bred by Dr. Joseph Goldberger.

Type.—No. 8029, U. S. National Museum.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF PSOROPHORA SIGNIPENNIS:

Female.—Proboscis cylindrical, rather stout, uniform, labellæ tapering, brown; vestiture at both ends dark brown, soiled white in the middle, mixed with a few brown scales; setæ minute, curved, dark, those on labellæ more prominently outstanding. Palpi about one-fourth as long as proboscis, thick; vestiture of dark-brown and white scales intermixed, a few moderate black bristles. Antennæ rather short and thick; joints broad and somewhat compressed, subequal, blackish, pale at the articulations, minutely pilose; hairs of whorls very short, sparse, black; second segment paler and longer than the others; tori subspherical, with a cup-shaped apical excavation, sordid whitish, subpruinose. Clypeus short, broadly rounded at tip, slightly prominent, luteous with a black shade at base and sides, nude and shining. Eyes black. Occiput narrow, convex, brown, rather sparsely clothed with narrow, curved pale-golden scales, a few flat white elliptical ones along eye-margin, many narrow, erect, forked pale scales on the nape; sides clothed with broad, flat white scales, inclosing a dark patch at ocular margin; bristles along margins of eyes rather short and mostly pale.

Prothoracic lobes long and narrow, remote dorsally, brown, with narrow, curved golden scales and black bristles. Mesonotum brown, with three darker impressed lines; vestiture golden brown medianly, pale toward margins, of small, narrow curved scales uniformly distributed, except over ante-scutellar space, which is narrowly bare; bristles short, dark brown, those over roots of wings dense, pale yellowish. Scutellum trilobate, the mid lobe large, brown, clothed with yellowish-white scales and with a group of about ten brown bristles on each lobe. Postnotum elliptical, pale brown, nude. Pleuræ and coxæ pale brown, with narrow elliptical white scales and pale setæ.

Abdomen subcylindrical, flattened, strongly tapering towards apex; vestiture dorsally of pale-brown and yellowish-white scales, some blackish ones intermixed, some of these forming irregular central segmentary spots; the segments show ill-defined broad whitish apical bands, medianly produced; setæ in rows at extremities of segments, dark; ventral vestiture of pale scales with a few intermixed dark ones.

Wings moderate, hyaline; stem of second marginal cell about as long as its cell, that of second posterior cell very slightly shorter; basal cross-vein distant a little less than its own length from anterior cross-vein; veins pale; vestiture of rather broad white and black scales intermixed, along basal half of costa the scales are evenly intermixed, on apical half three elongate black spots separated by longer white-scaled areas; other veins with scales evenly mixed; sixth vein white at its tip, a black patch preceding; outstanding scales on apical part of wing narrowly lanceolate, gray, many of the others broader and subtruncate; fringe alternating black and white. Halteres entirely whitish.

Legs moderately long, without any outstanding scales, pale yellowish; vestiture of brownish-black and yellowish-white scales intermixed, rather evenly so on femora and tibiæ; before tips of femora and in a preceding area the black

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scales predominate, defining a pale tip and subapical ring; first joint of hind tarsals largely pale, with a dark tip and dark subbasal ring, the succeeding joints with basal halves pale, apical halves dark; front and mid tarsi with fourth joint narrowly white ringed at base, the last joint entirely dark scaled. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 3.3 mm.

Male.—Proboscis straight, the apical half slightly thickened. Palpi exceeding the proboscis by nearly the length of the last two joints which are long and slender and scarcely thickened; vestiture of brown and white scales rather irregularly intermixed; apex of long joint and the last two joints with long black hairs; bases of last two joints white scaled above. Antennæ plumose, the last two joints long, pilose, the others short, thickened at insertions of the long, dense hair-whorls, sordid luteous; hairs pale brown. Coloration similar to the female. Abdomen elongate, strongly depressed, with long, luteous lateral ciliation. Wings narrower than in the female, the stems of the fork-cells longer and the vestiture much more scanty, scarcely showing the characteristic markings. Claw formula, 2.1–2.1–0.0.

Length: Body about 4.5 mm.; wing 3 mm.

Genitalia (plate 23, fig. 161): Side-pieces rounded at tip and about twice as long as wide; apical lobe very slightly developed, indicated by a narrow fold; no basal lobe. Clasp-filament stout, swollen, reticulate, a rather long terminal articulated spine. Harpes concave, with thickened revolute inner margins and curved tips widely divided into two teeth. Harpagones with a slender ligulate base and expanded apex bearing five setæ. Unci forming a small cone with a revolute margin, no basal appendages.

Larva, Stage IV (plate 116, fig. 397).—Head rounded, wider than long, narrowed before eyes, a slight notch at insertion of antennæ, front margin broadly arcuate. Antennæ long but not extraordinarily so, subcylindrical, slightly tapered, spined on basal two-thirds; a large tuft at middle; two long subapical spines, two short spines and a digit at tip. Eyes large, transverse, pointed. Mental plate elongate triangular, longer than wide, a central tooth with fourteen on each side, all much alike, the basal one smaller. Mandible quadrangular; a long filament and a short one before tip; an outer row of cilia from a collar; five small tufts from angular prominences on outer margin; dentition of four teeth on a short process, the fourth longest; a long spine before, two short teeth at base, two broad filaments within; process below elongate, furcate, with a row of hairs on outer side; basal angle small; a row of hairs within; a row of long hairs at base. Maxilla subspherical, divided by a band-shaped suture; inner half with two rows of cilia; a row of long hairs at tip; outer half with a single large filament at middle next suture. Palpus short and stout, with four irregularly rudimentary digits. Thorax rounded, wider than long; hairs abundant but not long. Abdomen stout, anterior segments shorter. Tracheal tubes broad, band-shaped. Air-tube large, strongly inflated, tapered on outer half, three times as long as wide; pecten of four teeth scattered on basal fourth of tube, single tooth a long spine with broad base with three or four basal branches, sometimes a short one on the other side. Lateral comb of eighth segment of six scales joined by a chitinous band; single scale elliptical, with a stout, curved apical spine, a smaller subapical one, and still smaller ones between and below. Anal segment longer than wide, ringed by the plate; dorsal tuft a long hair and brush on each side; a small lateral tuft; ventral brush well developed, extending along the ventral line to base. Anal gills long, twice as long as the segment, regularly tapered to a sharp tip, each with a slight central trachea.

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Dr. T. D. Berry collected the larvæ in a puddle two days after a rain; pupæ were formed on the fourth day and imagos on the fifth.

Southwestern United States and northern Mexico, principally in dry regions.

Laredo, Texas (T. D. Berry); Austin, Texas, August 10, 1908 (A. W. Morrill); Mesilla, New Mexico, October 4 and 11, 1893 (T. D. A. Cockerell); Monterey, Mexico (J. Goldberger).

Psorophora signipennis has come to hand in but few specimens, mostly in poor condition. The ornamentation of the mesonotum appears to be somewhat variable, some specimens showing a broad median stripe of brownish golden scales.

PSOROPHORA DISCOLOR (Coquillett).

Culex discolor Coquillett, Can. Ent., xxxv, 256, 1903.
Culex discolor Smith, Ent. News, xv, 147, 1904.
Culex discolor Dyar, Journ. N. Y. Ent. Soc., xii, 173, 1904.
Culex discolor Felt, Bull. 79, N. Y. State Mus., 297, 1904.
Grabhamia discolor Felt, Bull. 79, N. Y. State Mus., 391*b*, 1904.
Culex discolor Smith, N. J. Agr. Exp. Stat., Bull. 171, 37, 1904.
Culex discolor Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 193, 1905.
Grabhamia discolor Felt, Bull. 97, N. Y. State Mus., 472, 1905.
Feltidia discolor Dyar, Journ. N. Y. Ent. Soc., xiii, 108, 1905.
Ceratocystia discolor Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 183, 1906.
Grabhamia discolor Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 3, 1906.
Grabhamia discolor Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.
Culex discolor Howard, Osler's Modern Medicine, i, 377, 1907.
Grabhamia discolor Theobald, Mon. Culicid., iv, 309, 1907.
Culex (*Grabhamia*) *discolor* Viereck, 1st Ann. Rept. Comm. Health Pa., 471, 1908.
Aëdes discolor Thibault, Proc. Ent. Soc. Wash., xii, 16, 1910.
Grabhamia discolor Theobald, Mon. Culic., v, 284, 1910.
Aëdes discolor Morse, Ann. Rept. N. J. State Mus., 1909, 717, 1910.

ORIGINAL DESCRIPTION OF CULEX DISCOLOR:

Female. Differs from the above description of *nanus* as follows: palpi with a cluster of white scales at the apices, upright scales of occiput yellow, whitish cross-bands of abdomen prolonged forward in the middle, crossing or almost crossing the segments, scales on posterior side of front and middle tibiæ and on anterior side of the hind ones almost wholly pale yellow, first tarsal joint bearing many yellow scales, black and yellow scales of wings not evenly distributed, the black ones forming a distinct spot at forking of the second vein with the third, another on upper branch of fifth vein at the hind cross-vein, and a third on the apical third of the last vein, remaining scales of this vein wholly yellow; length 4 mm. A specimen from Delair, New Jersey, received from Prof. J. B. Smith.

Type.—No. 6894, U. S. National Museum.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF PSOROPHORA DISCOLOR:

Female.—Proboscis subcylindrical, moderate, uniform, nearly straight, rather short, labellæ conically tapered; vestiture of small dense scales, black on apical and basal fourths, central half yellowish white; setæ very small, curved, black, those on labellæ more prominently outstanding. Palpi about one-fourth as long as proboscis, stout, covered with pale and dark scales intermixed; tips silver scaled; setæ short, stiff, black. Antennæ moderate, rather short, joints subequal, basal ones short, especially the third, fourth and fifth, pilose, rugose, blackish; tori subspherical, with a cup-shaped apical excavation, rather pale brown, with a crest of pale scales; hairs of whorls short, brown. Clypeus elliptical, convex, brown, nude. Eyes purplish black. Occiput convex, narrow, black, densely clothed with narrow, curved golden scales, most conspicuous mesially and bordering the eyes, and slender upright forked luteous ones which are most numerous on the nape; bristles along margins of eyes mostly pale.

Prothoracic lobes moderate, remote dorsally, blackish, with a few narrow golden scales and dark bristles. Mesonotum brownish, two dorsal lines rather strongly impressed and darker colored; vestiture of small, narrow, curved golden

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scales which hardly more than half cover the dark ground, even in fresh specimens, giving the effect of brown with a brassy luster; bristles partly pale, partly brown, rather short. Scutellum trilobate, the mid lobe prominent, clothed with similar scales as mesonotum, each lobe with about ten fine, long pale bristles. Postnotum elliptical, prominent, blackish, nude, slightly pruinose. Pleurae and coxae brown, clothed with narrow, elliptical whitish scales and rather short pale bristles.

Abdomen subcylindrical, depressed, terminal segments tapered, membrane grayish; dorsal vestiture of flat yellowish-white and brownish-black scales intermixed, and with segmental broad apical bands of white scales, produced centrally into a median stripe, the white scales predominating on last segment; first segment with a median patch of white scales and with many long pale setae; hairs abundant, particularly laterally; beneath the scaling is more confused, the pale scales predominating except on last segment.

Wings rather broad, hyaline, the veins pale; stems of both the fork-cells considerably shorter than their cells; basal cross-vein distant twice its own length from anterior cross-vein; scales black and dull whitish, arranged in obscure patches; costa nearly entirely black scaled except for a long white spot at outer fourth; a distinct black patch at base of third vein and a longer one proximally on upper branch of fifth vein; bases of second marginal and second posterior cells and tips of all the veins dark scaled; fifth vein black scaled up to fork; sixth vein with the apical third dark-scaled; most of the other scales whitish; fringe blackish, unspotted; outstanding scales on outer half of wing linear-lanceolate; a distinct black spot composed of short, subtruncate scales at base of third vein, more diffuse patches of long blackish scales on the second vein at cross-vein and at base of fork and on fourth vein at base of fork. Halteres entirely pale.

Legs moderately long and slender, pale, clothed with small, flat pale-yellowish scales; upper side of femora and tibiae with black scales intermixed, becoming predominant at tips; femora with an ill-defined ring of pale scales near tip; tibiae with a narrow white ring at base; knees pale; tarsal joints black tipped, terminal ones broadly so; second to fourth joint of hind legs distinctly white ringed at base, rings narrower on outer joints; front tarsi with last three joints black. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 3.7 mm.

Male.—Proboscis straight, uniform, rather slender, entirely dark scaled dorsally, pale scaled medianly beneath. Palpi exceeding the proboscis by more than the length of the last joint, the last two joints long and slightly thickened; long joint mostly dark scaled, a pale ring before middle; two last joints black scaled, narrowly white-scaled at bases; end of long joint and the last joints with many long brown hairs. Antennae plumose, the last two joints long and slender, pilose, the others short, pale, blackish at the swollen insertions of the whorls; hairs of whorls long, dense, pale, shading to blackish. Coloration similar to the female. Abdomen elongate, depressed, the sides with abundant pale ciliation. Wings much narrower than in the female, the stems of the fork-cells about equal to their cells; vestiture less abundant, the characteristic markings obscured. Claw formula, 2.1–2.1–0.0.

Length: Body about 5 mm.; wing 3.7 mm.

Genitalia (plate 21, fig. 150): Side-pieces conically tapered, about twice as long as wide; apical lobe well developed, prominent, conical; no basal lobe. Clasp-filament large, prominently swollen in middle, with a rather large, apical, inserted articulated spine. Harpes concave, broad, inner margin thickened and revolute, tip widely cleft, forming two apical teeth directed laterally. Harpagones with a small ligulate base and expanded triangulate tip bearing a row

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of six stout setæ of various shapes, the short ones with curved tips. Unci contiguous, forming a conical plate with narrowly cleft tip.

Larva, Stage IV (see figure of the entire larva, plate 58).—Head rounded, wider than long, a wide notch at insertion of antennæ, front margin broadly arcuate. Antennæ large, bent sharply at basal third, again less sharply at distal third, swollen without, tip tapered; spined all over, most densely so at base; a large tuft near middle; an angular projection at outer third from which arise two long hairs; a single hair and two slender digits at tip. Eyes large, transverse, pointed at ends. Both pairs of dorsal head-hairs single, ante-antennal tuft double. Mental plate triangular, about as long as wide, central tooth broad and rounded, with eight teeth on each side, becoming smaller basally, the last very small. Mandible quadrangular, smooth without; two filaments near tip; an outer row of stout cilia; four little tufts on prominences on outer margin; dentition of five teeth on a slight prominence, first and fourth longer; a long filament without, three short teeth at base, two short filaments and a seta within; process below bent, furcate at tip, one fork very slender, with patches of hair; basal process smooth; ten setæ at base. Maxilla elongate, rounded, narrower without, divided by a suture; inner half shortly haired basally; a long fringe of hair along suture for over half its length; outer half with two basally placed digits and a subapical spine. Palpus very small, with two digits only. Thorax rounded, wider than long; hairs abundant, subdorsal, prothoracic ones single and as long as head. Abdomen stout, the segments nearly equal; lateral tufts multiple on first two segments, triple on third, double on fourth and fifth, absent on sixth, long and single on seventh; long, single, subdorsal hairs on third to seventh segments; tracheal tubes very narrow, strongly flexuous. Air-tube small, slightly inflated at base, subconstricted at outer third, three times as long as wide; pecten reaching halfway, of few large remotely spaced teeth, the single tooth trifurcate outwardly, with smaller branches below, the shaft smooth; a large tuft beyond middle of tube and beyond pecten. Lateral comb of eighth segment of six scales joined by a basal chitinous band; single scale three times as long as wide, with a long terminal spine, a long, curved subapical one, the sides fringed with smaller spinules. Anal segment as long as wide, ringed by the plate; dorsal tuft a group of four hairs on each side; a single long lateral hair; ventral brush of rather sparsely placed long-stemmed tufts reaching halfway up the ventral line. Anal gills very long, three times as long as the segment, regularly tapered to a sharp tip, each with a very stout, dark colored, irregularly flexuous central trachea.

Egg (plate 146, fig. 674).—Fusiform, black, reticulate, spinose, the spines recumbent, pointing towards the micropylar end and about two-thirds the length of the reticulations.

The larvæ live in temporary ground-pools and develop rapidly. They generally lie upon the bottom on their backs with the mouth-brushes in action. Mr. Barber captured several adults which came to bite, as we suppose. The males swarm; we have specimens from Mr. Tucker taken from a swarm.

Southern United States to southern Mexico.

Delair, New Jersey, June 28 (W. P. Seal); Washington, District of Columbia, September 9, 1901 (J. Kotinsky); Grassymead, Virginia, May 24 (H. G. Dyar); Clarksdale, Mississippi, July 31, 1904 (H. S. Barber); Belzona, Mississippi, August 4, 1904 (H. S. Barber); Westpoint, Mississippi, August 12, 1904 (H. S. Barber); Baton Rouge, Louisiana (J. W. Dupree); Plano, Texas, May, "swarming at dusk" (E. S. Tucker); Brownsville, Texas, May 9, 1904 (H. S. Barber); Willcox, Arizona, July 31, 1909 (A. K. Fisher), Tehuantepec, Mexico, July 3, 1905 (F. Knab).

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Psorophora discolor agrees in structure and appearance with other members of the *Janthinosoma* group, the male genitalia being perfectly typical. The larvæ also in the structure of the comb and otherwise agree perfectly, but in the air-tube and antennæ they differ widely. All the other *Janthinosoma* larvæ have the antennæ long, but slender, the air-tube more or less conspicuously inflated. In this species the air-tube is small, not inflated, while the antennæ are markedly inflated and distorted. We surmise that the inflated portion serves as an air reservoir, enabling these larvæ to remain longer beneath the surface than they otherwise could, and it is therefore immaterial whether the air-tube or the antennæ are used as such a reservoir. It is a case of the adaptation of different organs for a similar purpose. Other species, as *Orthopodomyia signifer*, have an enlargement of the tracheal tubes in the thorax. This difference, at first sight striking, appears to be but one of adaptation, and without special classificatory significance. The erection of a separate genus for *discolor* was, therefore, unwarranted.

PSOROPHORA JAMAICENSIS (Theobald).

Culex perturbans Coquillett (not Walker), Proc. U. S. Nat. Mus., xxii, 250, 1900.
Culex perturbans Coquillett (in part, not Walker), U. S. Dept. Agr., Div. Ent., Circular 40, 2d ser., 6, 1900.
Culex perturbans Howard (in part, not Walker), U. S. Dept. Agr., Div. Ent., Bull. 25, n. s., 20, 30, 1900.
Culex jamaicensis Theobald, Mon. Culic., i, 345, 1901.
Culex jamaicensis Giles, Gnats or Mosq., 2 ed., 394, 1902.
Grabhamia jamaicensis Theobald, Mon. Culic., iii, 244, 1903.
Culex jamaicensis Taylor, Rev. de Méd. Trop., iv, 109, 119, 166, 172, 1903.
Culex jamaicensis and *Culex perturbans* Pazos, Bull. Soc. Ent. France, 1904, 134, 1904.
Grabhamia jamaicensis Felt, Bull. 79, N. Y. State Mus., 391*b*, 1904.
Culex jamaicensis Coffin, in Shattuck, The Bahama Ids., 283, 1905.
Feltidia jamaicensis Dyar, Proc. Ent. Soc. Wash., vii, 47, 1905.
Culex jamaicensis Blanchard, Les Moustiques, 279, 1905.
Grabhamia jamaicensis Blanchard, Les Moustiques, 397, 1905.
Grabhamia jamaicensis Theobald, Mosq. or Culic. of Jamaica, 29, 39, 1905.
Grabhamia jamaicensis Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.
Janthinosoma jamaicensis Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xiv, 183, 1906.
Tæniorhynchus walsinghamii Theobald, Mon. Culic., iv, 484, 1907.
Aëdes jamaicensis Pazos, San. y Ben., ii, 46, 315, 1909.
Grabhamia jamaicensis Theobald (in part), Mon. Culic., v, 281, 1910.
Tæniorhynchus walsinghamii Theobald, Mon. Culic., v, 419, 427, 1910.

ORIGINAL DESCRIPTION OF CULEX JAMAICENSIS:

Thorax dark brown, with four round patches of creamy scales and a few pale ones before the scutellum. Abdomen dark brown, with pale scaled apical bands, those of the second segment forming a triangular pale patch, the next four with the patches broken in the middle; last segment black; venter mostly yellow-scaled. Wings with black and white scales; a small black spot at the third long vein. Legs brown, banded, and speckled with yellowish scales; tarsi basally banded white.

♀. Head brown; occiput with scattered curved cinereous scales and black upright forked ones, white and black flat ones at the sides of the head and numerous black bristles; clypeus chestnut-brown; eyes silvery; antennæ brown, basal joint large, pale brown, arising from a dark area; first and second joints with apical grey scales; palpi brown, with some yellowish scales, white at the apex, with moderately long dark bristles; proboscis black at the tip and slightly darker at the base, the middle with yellowish scales thickly spread over the brown surface.

Thorax very dark brown, with long brown hairs and with deep coppery-brown curved scales and a few black bristles; four round patches of creamy scales and a few of the same colour in front of the scutellum; the latter with pale curved scales and deep brown border-bristles; metanotum deep brown; pleurae with patches of grey scales.

Abdomen black, the first segment with a few apical creamy scales and long yellowish-brown hairs; second segment with a distinct creamy patch of apical scales forming a triangle with its base parallel with the apical border; next four segments

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with the creamy patches of scales broken in the middle, on the fourth and fifth segments the patches forming two quite separate lateral spots; last segment mostly black; ventrally covered with pale yellow and brown scales with a few black marks.

Wings with the veins covered with black and white scales; a distinctive character is that the base of the third longitudinal where it meets the cross-veins forms a very small deep black spot. Halteres pale testaceous.

Legs banded and speckled with yellow scales; fore femora black, with a pale ring near the apex and with scattered yellow scales, pale underneath; knee white; tibiae black, spotted with yellow scales; metatarsus with a basal and median band of yellow; first two tarsi basally white banded, remainder black; in the mid legs the markings are the same, but there is a trace of banding on the third tarsus, and the femora are whitish beneath except at the apex; in the hind legs all the tarsal joints are basally banded and the ring of the femora is more distinct, whilst ventrally they are like those of the mid legs. Mid and hind ungues equal and simple.

Length.—5.5 mm.

Habitat.—Jamaica (Grabham) (8. 2. 1900).

Time of capture.—December.

Observations.—A very distinct species, easily recognized by the black speck on the wing, the curious banding and mottling of the legs and the adornment of the abdomen.

It was bred by Dr. Grabham from larvae collected along Spanish Road, Kingston.

ORIGINAL DESCRIPTION OF TÆNIORHYNCHUS WALSINGHAMII:

Head brown with grey and brown scales; proboscis banded; palpi brown white at apex. Thorax brown with golden brown scales showing some ornamentation. Abdomen deep brown with median single and double pale scaled areas on the segments and lateral pale areas. Legs brown with narrow basal white bands to the tarsal segments, tibiae with spots and the femora with a white ring towards the apex. Wings with mottled scales.

♀. Head brown with narrow-curved grey scales, brown and pale brown upright forked ones, a border around the eyes of small pale narrow-curved scales, flat black, then creamy lateral scales. Proboscis deep brown with a pale creamy median area not extending completely around the proboscis to make a band; palpi deep brown, with black chaetae and pale scales apically; antennae pale brown; clypeus deep brown.

Thorax deep brown, with narrow-curved golden scales, showing traces of ornamentation and becoming paler in front of the scutellum and over the roots of the wings; chaetae blackish; scutellum pale brown with narrow-curved pale scales; metanotum brown; pleurae brown with dense flat white scales.

Abdomen brown with median pale creamy scaled areas, on some segments divided into two pale spots, and extending the whole length of the segments, with lateral white lines of scales extending all down the segments; border-bristles brown; venter pale scaled.

Legs brown with the femora yellowish at the base, a white apex and a white ring towards the apex; tibiae deep brown with white spots, first three fore and mid tarsal segments with narrow basal white bands; in the hind legs all the tarsals have narrow basal white bands; fore and mid ungues equal, simple, rather large; hind equal, simple and small.

Wings mottled with creamy and brown scales, the scales somewhat denser at the base of the third vein; first sub-marginal cell slightly longer and much narrower than the second posterior cell, its stem very nearly half as long as the cell, its base nearer the apex of the wing; stem of the second posterior, which is broad and long, about half the length of the cell; posterior cross-vein rather more than twice its own length distant from the mid.

Length.—4.5 mm.

Habitat.—Runaway Bay, Jamaica (Lord Walsingham).

Time of capture.—April.

Observations.—Described from a perfect female taken by Lord Walsingham. It bears a very strong resemblance to *T. fasciolatus*, Arribalzaga, but can be told by the mottled wings on which the scales are narrower, by the different venation, especially in the much larger size of the second posterior cell and by its stem being much shorter than in *fasciolatus*, also by the abdominal adornment.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF PSOROPHORA JAMAICENSIS:

Female.—Proboscis moderate, cylindrical, uniform, labellæ conically tapered; vestiture of flat black scales, a broad band of yellowish white ones in the middle irregularly limited, with a few black scales intermixed; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short and thick,

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about one-fourth as long as proboscis; vestiture black, broadly white at tip; setæ moderate, black. Antennæ slender; joints subequal, black, rugose, pilose, basal joints shorter than distal ones; second joint pale at base; tori subspherical, with a cup-shaped apical excavation, dark brown, slightly pruinose, with narrow whitish scales; hairs of whorls rather short, sparse, black. Clypeus prominent, conically rounded, brown, nude. Eyes black. Occiput narrow, deep brown, clothed with very narrow, curved, shining pale scales and rather numerous upright, very slender, short black forked scales, dense and broader and with a brown luster on the nape; bristles along margin of eyes mostly black, a few pale ones at vertex.

Prothoracic lobes moderate, narrow, remote dorsally, sparsely clothed with very narrow, curved pale-golden scales and black bristles. Mesonotum blackish brown, the impressed bare dorsal stripes apparent at anterior margin, obsolete behind; vestiture of fine, narrow, curved reddish-brown scales intermixed with pale golden ones, the pale scales form three ill-defined bars on anterior margin and on the disk a pair of rounded spots which are on the edges of the lateral depressions; pale scales also in front of the ante-scutellar bare space and marginally, particularly above roots of wings; bristles rather short, numerous, black. Scutellum trilobate, middle lobe prominent, grayish luteous, vestiture of narrow, curved pale-golden scales, each lobe with about ten black bristles. Postnotum elliptical, prominent, brown with a slight pale pruinosity, nude. Pleuræ and coxæ brown, clothed with narrow, elliptical, flat white scales and a few dark setæ.

Abdomen subcylindrical, tapering posteriorly, the cerci exserted; dorsal vestiture of black and white scales, the white ones tending to form transverse apical bands, more distinct on basal segments, triangular on second and third, more confused on succeeding ones and forming irregular submedian patches as well as apical lateral spots and medianly divided apical bands; venter clothed mostly with pale ochraceous scales, the dark ones forming a double row of subapical segmentary spots.

Wings rather broad, hyaline; petiole of second marginal cell about half as long as its cell or even shorter, that of second posterior cell about the same proportion; basal cross-vein distant more than its own length from anterior cross-vein; veins brown; scales rather broadly triangular with blunt tips, black and white intermixed, the black predominating; at base of third vein is a small, dense patch of black scales; outstanding scales on outer half of wing broadly linear, mostly blackish; fringe brown, appearing paler in patches by reflection. Halteres pale whitish.

Legs rather long and slender with long coarse setæ, especially on tips of femora; femora black scaled, peppered with white, narrowly white at base and tip and with a subapical white ring; knees white; tibiæ black, with many little round patches of white scales; tarsi black, each joint with a small white basal ring, first tarsal joint of middle and hind legs with a small median ring in addition; front tarsi with the last two joints and mid tarsi with the last joint entirely black. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis straight, rather long and slender, uniform, dark scaled throughout. Palpi exceeding the proboscis by nearly the length of the last two joints, which are long, slightly thickened and upturned; vestiture black, membrane showing in a whitish ring before middle of long joint, patches of white scales at bases of last two joints; apex of long joint and last two joints with dense, long black hairs. Antennæ plumose; last two joints long, pilose, the others shortened, the annular incrassations at origins of whorls black, terminal parts of joints pale; hairs of whorls numerous, long, brown. Coloration similar to the female. Abdomen long, strongly depressed, with long and abundant pale

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reddish brown lateral ciliation. Wings narrower than in the female, the stems of the fork-cells much longer, the petiole of the second marginal cell being longer than the cell; clothing of veins scantily developed. Claw formula, 2.1–2.1–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 22, fig. 154): Side-pieces about twice as long as wide, tips expanded by a conically tapered apical lobe which forms a regular continuation of side-piece. Clasp-filament stout, greatly swollen in the middle on the inner side, a rather long stout articulate apical spine. Harpes flat, concave, inner margin thickened and revolute, widely cleft at apex, forming a short point projecting laterally. Harpagones with a ligulate base and expanded tip bearing five very stout setæ in a row. Unci approximate, forming a rather slender comb with revolute margins touching along mid line.

Larva, Stage IV (plate 115, fig. 394).—Head rounded, widest through eyes, bulging at the sides, a notch at insertion of antennæ, front margin arcuate. Antennæ moderate, not as long as head, well spined, the tuft slightly beyond the middle; four spines and a digit on a pedicel at tip. Dorsal head-tufts multiple. Mental plate elongate triangular, with a central tooth and thirteen on each side, the basal ones more remotely spaced and broader. Mandible quadrangular; a long filament and two short ones before tip; an outer row of cilia from a collar; a row of conical prominences on outer margin, each bearing a single feathered hair and tuft of short ones; dentition in continuation of margin, of four teeth, the first the longest; a slender tooth before: a broad tooth at base with six cusps; a coarsely serrate filament and row of three hairs within; process below roundedly inflated, furcate, a row of hairs near outer margin and a tuft at tip of each limb; basal angle prominent; a row of hairs within, nearly continuous with basal row. Maxilla conical, divided by a suture; inner half with long spines on margin, the apical ones feathered, a row of cilia within; a single articulated filament near the apex and adjoining the suture; a row of long hairs at tip; a spine on outer margin. Palpus short and stout, with four rudimentary digits. Thorax rounded, wider than long. Abdomen moderate, the anterior segments shorter. Air-tube inflated, subfusiform, tapered on outer half; pecten of three teeth on basal fourth; single tooth furcate, or with two to five basal branches; a small tuft at outer third. Lateral comb of eighth segment of six scales on a weak membranous plate; single scale with trifid apex and small lateral serrations. Anal segment longer than wide, ringed by the plate; dorsal tuft a brush and long hair on each side; a small lateral tuft; ventral brush well developed, preceded by tufts along the ventral line to base, piercing the chitinous ring. Anal gills long, twice as long as the segment, regularly tapered.

The eggs have been described by Taylor. They are deposited singly, are large, black and spiny, resembling those of other members of the genus; Taylor gives the length as 0.76 mm. and the greatest diameter 0.24 mm. and states that from 50 to 75 are deposited.

The larvæ occur in natural collections of water upon the ground and develop rapidly. Mr. Busck found them numerous in a large pig-pond near a road, in a rain puddle in mountainous country, and in a pot-hole in stones. Mr. Schwarz captured adults in the woods and fields, and once in the house. Taylor states that this is a rural species and that its appearance coincides with the season of rains. "Generally not found in houses, evidently securing from cattle the blood necessary for its propagation. The bite is slightly painful."

Greater Antilles and Bahama Islands.

Bayamon, Porto Rico, January, 1899 (A. Busck); San Francisco Mountains, Santo Domingo, August 29, September 8, 1905 (A. Busck); Kingston, Jamaica (M. Grabham); Cayamas, Cuba, June 6 (E. A. Schwarz); Havana, Cuba,

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October 18, 1901 (J. Carroll); Baracoa, Cuba, August (A. Busck); Pinar del Rio, Cuba, 1900; Havana, Cuba, May 14, 1902 (J. R. Taylor); San Antonio de los Baños, Cuba (J. H. Pazos); Andros Island, Bahamas, June 26, 1903 (T. H. Coffin); Green Cay, Bahamas, June 29, 1903 (T. H. Coffin); Nassau, New Providence, Bahamas, June 22, 1903 (T. H. Coffin).

Psorophora jamaicensis is confined to the Greater Antilles and the Bahamas. It is closely allied to species upon the mainland, but we think specifically distinct.

PSOROPHORA TEXANUM (Dyar & Knab).

Janthinosoma texanum Dyar & Knab, Proc. Biol. Soc. Wash., xix, 135, 1906.
Janthinosoma texanum Theobald, Mon. Culic., v, 605, 1910.

ORIGINAL DESCRIPTION OF JANTHINOSOMA TEXANUM:

Hind legs without raised scales; tarsal joints with pale bands; first hind tarsal joint with a narrow white ring; thorax golden brown; white ring of the first hind tarsal joint one-third or more as broad as the joint. Else as in *J. jamaicensis* Theobald.

7 specimens, Brownsville, Texas, May 21, 1904 (H. S. Barber).

Type.—Cat. No. 9971, U. S. Nat. Mus.

DESCRIPTION OF FEMALE OF PSOROPHORA TEXANUM (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderate, cylindrical, slender, uniform, rather short; vestiture of small appressed scales, black at apical and basal fourths, the median half white; setæ short, curved, black, those on the moderate conical labellæ more prominently outstanding. Palpi rather more than one-fourth the length of proboscis, stout, clothed with brownish scales, except at tip, where they are white; setæ moderate, black. Antennæ moderate, second joint over three times as long as wide, the third, fourth and fifth joints shorter, pale brown and densely pale pilose, the succeeding joints more slender, black, pilose; tori subspherical, with an excavated tip, luteous brown, with a small patch of white scales within. Clypeus rather short, prominent, dark brown, nude. Eyes black. Occiput moderate, convex, black, clothed with narrow, curved soiled whitish scales which do not conceal the black ground and are intermixed with many narrow, forked, brown upright ones; scales on sides broader, white, contiguous; setæ bordering eyes rather short, curved, pale.

Prothoracic lobes remote dorsally, moderate, blackish, clothed with a few narrow, curved whitish scales and short black bristles. Mesonotum deep brown, clothed with narrow, curved scales about half covering the surface, the scales reddish brown and brassy, the brown ones predominating dorsally, the brassy ones at sides of disk and surrounding ante-scutellar bare space; there is a small bare spot on each side of middle on anterior third of mesonotum, before and behind which the brassy scales are segregated into patches; scales without any blue tinge. Scutellum trilobate, black, rather densely clothed with narrow, curved silvery scales, each lobe with about ten moderate black bristles. Postnotum elliptical, prominent, blackish, nude. Pleuræ and coxæ brown, clothed with narrow, elliptical white scales and blackish setæ.

Abdomen subcylindrical, flattened, tapering posteriorly, the slender blade-like cerci prominently exserted; dorsal vestiture of dull black scales, apices of second and third segments with a diffused band of soiled yellowish-white scales, the two following segments with large, irregular, medianly divided apical bands of white scales, the following with large sublateral patches extending nearly the whole length of the segment, the seventh segment with lateral whitish scales; first segment with a patch of white scales in the middle and with many long brown setæ; venter with black and white scales intermixed about equally, except on the seventh segment, where the black scales predominate.

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Wings rather broad; membrane hyaline, iridescent; stem of second marginal cell about three-fifths the length of its cell, that of second posterior cell much shorter than its cell; basal cross-vein distant its own length from anterior cross-vein; veins brownish; vestiture of rather broad truncate-tipped scales, black and white intermixed, the black predominating, the outstanding scales long, ligulate to narrowly lanceolate, blackish; a rather long patch of small, dense black scales at base of third vein; fringe dark, with pale shadings towards apex. Halteres entirely pale.

Legs rather long and slender, with coarse long setæ; femora black and white scaled, the black scales predominating, a narrow white ring at tip of trochanters and at outer fourth, apices white; tibiæ black scaled, with about twelve little patches of white scales evenly spaced; tarsi black, with moderate white rings at bases of joints, basal joints of all the tarsi with a broad median white ring; last joint of front and mid tarsi entirely black. Claw formula, 0.0–0.0–0.0.

Length: Body about 5 mm.; wing 4 mm.

Life history and habits unknown.

Texas.

Brownsville, May 21, June 5, 1904 (H. S. Barber).

We possess only the original type specimens from Brownsville, Texas. Further observations are needed to determine the validity of the species.

PSOROPHORA FLORIDENSE (Dyar & Knab).

Janthinosoma floridense Dyar & Knab, Proc. Biol. Soc. Wash., xix, 135, 1906.
Janthinosoma floridense Theobald, Mon. Culic., v, 603, 1910.

Original Description of Janthinosoma floridense:

As in *J. texanum* Dyar & Knab, but the thorax violet blue. The pale abdominal bands are powdery, interrupted dorsally and confused; the general color, including the wings, is dark, and the third vein has scale tufts throughout its length, instead of at base only.

105 specimens, Tampa, Kissimmee, Sanford, Arcadia, Bartow, Pokatee, Alligator Creek, Florida (Dyar & Caudell).

***Type*.—Cat. No. 9972, U. S. Nat. Mus.**

Description of Female, Male, and Larva of Psorophora floridense:

Female.—Proboscis rather short and stout, cylindrical, uniform; labellæ conically tapered; vestiture of black scales with a broad yellowish-white median ring with diffused edges and a few black scales intermixed; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short and stout, about one-fourth as long as proboscis, densely clothed with black scales, the tip pure white; setæ rather long and black. Antennæ moderate; joints subequal, black, rugose, with a silky luster which makes them appear part white in certain lights; proximal joints shorter than distal ones; tori subspherical, luteous, with a patch of white scales; hairs of whorls rather short, sparse, black. Clypeus elliptical, blackish, nude. Eyes black. Occiput short, black, with very narrow, curved bluish-white scales and many slender, erect, forked black ones; the scales about half cover the surface but are denser in a small patch in middle of each side, below which at eye-margin is a quadrate patch of broad blackish scales followed by broad white scales; also dense but narrow white scales on vertex.

Prothoracic lobes moderate, elliptical, remote dorsally, black, with narrow, curved white scales with a violaceous blue luster and many rather long black bristles. Mesonotum deep brown; vestiture of very narrow, curved, deep reddish-brown scales, variegated with pale violaceous blue ones, the pale-blue scales scattered along anterior margin and in a curved stripe along sides of disk connected to a rounded spot behind the sublateral bare depressions; a number of these scales scattered over the general surface and a large patch before antescutellar bare space and on either side of it; bristles numerous, longest at roots

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of wings, brown, with black tips. Scutellum trilobate, black, densely clothed with silvery violaceous scales, each lobe with a group of about ten black bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ and coxæ brown, clothed with rather narrow, elliptical white scales, the setæ short, blackish.

Abdomen subcylindrical, flattened, the posterior segments tapering; dorsum clothed with broad, flat black scales and yellowish-white ones, the white ones forming a broad apical band on second segment, on the following segments the apical band is divided medianly, on the fifth segment forming large, irregular, sublateral posterior spots, on the sixth and seventh segments the spots are again divided transversely, forming a pair of median and apical lateral spots; venter with black and light colored scales nearly evenly intermixed, some of the scales white and others ocherous, not forming a defined pattern, the black scales tending to form subapical bands, particularly on the distal segments; setæ rather numerous, short, mostly dark.

Wings rather broad, membrane smoky-hyaline; petiole of second marginal cell rather less than half as long as its cell, that of second posterior cell a little longer; basal cross-vein more than its own length distant from anterior cross-vein; veins brownish; vestiture of black scales with a few white ones irregularly intermixed, appressed scales of veins broad, with rounded-triangular tips, a short cluster of these at base of third vein and similar scales distributed along most of the length of this vein; outstanding scales on apical half of wing broadly linear, long, brown, those on fork of second vein broader and denser; fringe blackish. Halteres whitish, the knobs darker.

Legs rather long and slender, with long black setæ, especially on the femora; femora mostly whitish scaled below, black scales above with white ones intermixed, the extreme base and apex and a narrow subapical ring white; tibiæ black scaled, with numerous little patches of white scales, about ten in the length of the tibia; tarsi black scaled, each joint with a rather narrow white basal ring, the first joint with a narrow median white ring in addition; on the fore legs the last two joints and on the middle legs the last joint entirely black. Claw formula, 0.0–0.0–0.0.

Length: Body about 5.5 mm.; wing 4.5 mm.

Male.—Proboscis straight, rather long and slender, a narrow pale ring beyond the middle. Palpi exceeding the proboscis by the length of the last two joints, which are long, slightly thickened and upturned; vestiture black, small patches of white scales at bases of joints, a whitish bare ring at false articulation before middle of long joint; tip of long joint and last two joints with long, dense, dark brown hairs. Antennæ plumose, the last two joints long and pilose, the rest short, whitish, blackish at origins of hair-whorls; hairs long, dense, brown, appearing luteous in certain lights by reflection. Coloration similar to the female. Abdomen long, depressed, with long and dense, brown lateral ciliation. Wings narrower than in the female, less smoky, the stems of the fork-cells much longer, that of the second marginal cell being as long as its cell; vestiture much less developed; fringe pale gray. Claw formula, 2.1–2.1–0.0.

Length: Body about 5 mm.; wing 3.7 mm.

Genitalia (plate 22, fig. 153): Side-pieces about twice as long as wide, with a rounded tip, apical lobe well developed, prominent, rounded; no basal lobe. Clasp-filament stout, greatly swollen in center on inner side and a stout terminal articulated spine. Harpes flat, concave, inner margins thickened and revolute, curved over at tip, widely cleft to form a short tooth projecting laterally. Harpagones with a narrow ligulate base and triangular expanded apex bearing six stout setæ, of which the four inner ones are feathered. Unci approximate, forming a short stout comb with truncate tip, the margins broadly revolute, touching centrally.

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Larva, Stage IV (plate 115, fig. 393).—Head transverse, rounded, widest through eyes; antennæ long, stout, nearly uniform, spinose, a moderate tuft at middle; upper pair of dorsal head-hairs in fives, lower in threes, ante-antennal tuft multiple. Lateral comb of eighth segment of six to eight scales on a weak chitinous plate; single scale with small spines on angles and a long central point. Air-tube inflated, fusiform, about four times as long as basal diameter; pecten of five widely spaced teeth, the small hair-tuft at apical third of tube. Anal segment longer than wide, ringed by a chitinous band; dorsal tuft a long hair and multiple tuft on each side; ventral brush running along ventral line almost to base. Anal gills long, slender, tapering, equal.

The larvæ live in temporary ground-puddles. Dr. Dyar found them especially abundant in puddles without vegetation, such as new railroad ditches or excavations caused by digging in clay ground. In such situations they were often the only mosquito larvæ present. Although this species was very common, no specimens were taken attempting to bite. It seems probable that the adults do not bite man, at least habitually. Dr. Bryd found the larvæ in a small stream in the city.

Florida.

Tampa, March 18, 1905 (H. G. Dyar); Kissimmee, March 19, 1905 (H. G. Dyar); Sanford, March 17, 1905 (Dyar & Caudell); Alligator Creek, March 18, 1905 (A. N. Caudell); Pokatee, March 19, 1905 (A. N. Caudell); Arcadia, March 19, 1905 (A. N. Caudell); Bartow, March 20, 1905 (A. N. Caudell); Estero, August 16, 1906 (J. B. van Duzee); Jacksonville, July 2, 1906 (H. Byrd).

Psorophora floridense has been occasionally confused with the more northerly distributed *Psorophora columbiæ*.

PSOROPHORA TOLTECUM (Dyar & Knab).

Tæniorhynchus perturbans Parker, Beyer & Pothier (not Walker), Yell. Fever Inst., Bull. 13, 37, 38, 1903.

Janthinosoma jamaicensis Dyar & Knab (in part, not Theobald), Journ. N. Y. Ent. Soc., xiv, 183, 1906.

Janthinosoma toltecum Dyar & Knab, Proc. Biol. Soc. Wash., xix, 135, 1906.

Janthinosoma toltecum Theobald, Mon. Culic., v, 604, 1910.

ORIGINAL DESCRIPTION OF JANTHINOSOMA TOLTECUM:

As in *J. floridense* Dyar & Knab, but the pale abdominal bands are extensive, broken only on the last segments; the scales on the scutellum have a silvery luster.

89 specimens, Tehuantepec, Salina Cruz, Rincon Antonio, Santa Lucrecia, Almoloya, Mexico (F. Knab); Vera Cruz, Mexico (G. E. Beyer); Dallas, Texas, September 14 (W. E. Hinds).

Type.—Cat. No. 9973, U. S. Nat. Mus.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF PSOROPHORA TOLTECUM:

Female.—Proboscis rather short, subcylindrical, uniform, labellæ conically tapered; vestiture of small black scales at base and apex, the middle half yellowish white, the edges of this pale area diffused; setæ small, curved, black, those on labellæ more prominently outstanding. Palpi short and stout, about one-fourth as long as proboscis, black scaled, with white tips; setæ rather long and black. Antennæ moderate; basal joints short, distal ones longer, rugose, pilose, black, four basal ones paler; tori subspherical, with a cup-shaped apical depression, brown, a patch of white scales within; hairs of whorls sparse, short, black. Clypeus elliptical, prominent, dark brown, nude. Eyes black. Occiput narrow, convex, blackish, clothed with narrow, curved white scales and many slender, erect, forked, deep brown ones, a patch of broad, flat brown scales laterally at eye-margin, the white scales below dense, broad and flat; setæ along margins of eyes numerous, brown.

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Prothoracic lobes moderate, elliptical, remote dorsally, brown, clothed with narrow, curved white scales with a faint violaceous reflection and numerous rather short blackish bristles. Mesonotum deep brown, the two impressed, bare longitudinal stripes visible on anterior edge, concealed beyond by the vestiture; vestiture of narrow, curved white scales with a faint violaceous reflection interspersed in patches among the predominating bronzy brown ones; the whitish scales occur principally in lunate patches on anterior margin, in spots behind the lateral depressions, along the sides, and particularly about ante-scutellar bare space and above roots of wings; also two indistinct dorsal stripes. Scutellum trilobate, gray, clothed with narrow silvery scales, each lobe with a large group of brown bristles. Postnotum elliptical, prominent, dark brown, nude, slightly pruinose. Pleuræ and coxæ brown, clothed with narrowly elliptical white scales and with rows of short black bristles.

Abdomen subcylindrical, flattened, posterior segments tapering; dorsal vestiture of black and yellowish-white scales, the pale scales forming large apical bands and subquadrate subdorsal patches which leave narrow, black basal and sublateral margins; the bands uninterrupted on first three segments, posteriorly broken on median line, forming sublateral spots from near base to apex; lines of silvery-white scales on posterior margins of segments laterally to angles, the lateral margins narrowly white scaled except at bases of segments; first segment clothed with dull-whitish scales and with many pale-brown setæ; venter with black and pale scales intermixed, the pale ones predominating, the dark ones tending to form apical bands.

Wings rather broad, membrane hyaline with smoky tinge; petiole of second marginal cell shorter than its cell, that of second posterior cell of about same length as its cell; basal cross-vein more than its own length from anterior cross-vein; veins brownish; scales rather broadly triangular, blackish and dull white intermixed, the dark scales predominating, a small patch of black scales at base of third vein; outstanding scales ligulate, on terminal portion of wing lanceolate, mostly dark, but with a number of pale ones intermixed; fringe entirely dark. Halteres white, the tips slightly dusky.

Legs moderately long, rather stout; femora clothed with black and yellowish-white scales intermixed, the white ones predominating ventrally, extreme base and apex and a narrow subapical ring white; tibiæ black, with many little white patches; tarsi black, each joint with a white basal ring, the first joint with a median one in addition, on front tarsi the last two joints, on middle tarsi the last joint entirely black; setæ rather long, coarse, and black. Claw formula, 0.0–0.0–0.0.

Length: Body about 5 mm.; wing 4 mm.

Male.—Proboscis straight, dark scaled, with a pale ring beyond middle. Palpi exceeding the proboscis by nearly the length of the last two joints which are long, slightly thickened and upturned; vestiture black, white basally on last two joints, a bare white ring at the false articulation of long joint; apex of long joint and last two joints with dense, long blackish hairs. Antennæ plumose; last two joints long, slender, pilose, the others short, with a thickened black ring at the origins of hair-whorls and pale tips; hairs of whorls abundant, long, brown. Coloration similar to the female. Abdomen long, depressed, with dense and long, pale brown lateral ciliation. Wings much narrower than in the female, the stems of the fork-cells longer, the membrane not smoky tinged, the scaling on the veins less abundant. Claw formula, 2.1–2.1–0.0.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 22, fig. 155): Side-pieces more than twice as long as wide, apical lobe well developed, continuous with side-piece, forming a prominent apical angle; no basal lobe. Clasp-filament stout, strongly inflated on inner

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side, reticulate; a rather large terminal articulate spine. Harpes flat, concave, inner margin thickened and revolute, curved over at tip, denticulate, the apex slightly cleft. Harpagones with a narrow ligulate base, apex triangularly widened and bearing seven large smooth setæ. Unci approximate, forming a blunt-tipped cone, the margins strongly revolute and approximate medially.

Larva, Stage IV (plate 115, fig. 392).—Head transverse, rounded, widest through eyes; antennæ moderate, stout, nearly uniform, spinose, a rather small hair-tuft at middle; dorsal head-hairs in multiple tufts. Lateral abdominal hairs in sevens on first two segments, in twos on third to fifth segments, single on sixth. Lateral comb of eighth segment of six scales on a weak chitinous plate, each scale with spinules at angles and a long central spine. Air-tube inflated, fusiform, over three times as long as the basal diameter; pecten of four or five well separated teeth, a small hair-tuft at outer third. Anal segment longer than broad, ringed by a chitinous band; dorsal tuft a long hair and a tuft on each side; lateral tuft small; ventral brush well developed, running along ventral line nearly to base. Anal gills long, slender, tapering.

The larvæ live in temporary ground-puddles. Mr. Knab found them in cattle tracks in a marshy lane, in a rain-puddle in woods, in a large puddle in an old Indian village, in a roadside pool, in a ditch of foul water, in a large puddle which dried up very soon, in a muddy road, in a ditch by railroad tracks, and in a puddle in a stream-bed. Although abundant, no specimens were taken attempting to bite.

Southern Mexico to Texas.

Santa Lucrecia, State of Vera Cruz, Mexico, June 20, 1905 (F. Knab); Hacienda La Oaxaqueña, near Santa Lucrecia, Mexico, September, 1911 (F. W. Urich); Rincon Antonio, Oaxaca, Mexico, June 24, 1905 (F. Knab); Tehuantepec, Mexico, June 30, 1905 (F. Knab); Salina Cruz, Mexico, July 7, 1905 (F. Knab); Almoloya, Mexico, July 21, 1905 (F. Knab); Vera Cruz, Mexico, August, 1902 (G. E. Beyer); Dallas, Texas, September 14, 1905, and October 3, 1907 (W. E. Hinds, R. A. Cushman).

PSOROPHORA COLUMBIÆ (Dyar & Knab).

Culex perturbans Howard (not Walker), U. S. Dept. Agr., Div. Ent., Bull. 4, n. s., 22, 1896.

Culex perturbans Howard (in part, not Walker), U. S. Dept. Agr., Div. Ent., Bull. 25, n. s., 20, 30, 1900.

Culex perturbans Coquillett (not Walker), U. S. Dept. Agr., Div. Ent., Circ. 40, 2 Ser., 6, 1900.

Culex perturbans Howard (not Walker), Mosquitoes, 238, 1901.

Culex confinis Herrick (not Arribálzaga), Miss. Agr. Exp. Stat., Bull. 74, 17, 1901.

Culex confinis Dyar (not Arribálzaga), Journ. N. Y. Ent. Soc., ix, 179, 1901.

Culex confinis Smith (not Arribálzaga), Ent. News, xiii, 300, pl. xv, fig. 7, 1902.

Culex confinis Dyar (not Arribálzaga), Proc. Ent. Soc. Wash., v, 51, 1902.

Culex jamaicensis Dyar (not Theobald), Proc. Ent. Soc. Wash., v, 146, pl ii, fig. 9, 1903.

Culex jamaicensis Smith (not Theobald), N. J. Agr. Exp. Stat., Bull. 171, 37, 1904.

Grabhamia jamaicensis Herrick (not Theobald), Ent. News, xv, 81, 1904.

Culex jamaicensis Felt (not Theobald), Bull. 79, N. Y. State Mus., 293, 1904.

Culex confinis Felt (in part, not Arribálzaga), Bull. 79, N. Y. State Mus., 302, 1904.

Culex confinis Blanchard (in part, not Arribálzaga), Les Moustiques, 297, 1905.

Culex jamaicensis Smith (not Theobald), N. J. Agr. Exp. Sta., Rept. Mosq., 186, 1905.

Grabhamia jamaicensis Felt (not Theobald), Bull. 97, N. Y. State Mus., 472, 1905.

Janthinosoma jamaicensis Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xiv, 183, 1906.

Grabhamia jamaicensis Coquillett (not Theobald), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.

Grabhamia jamaicensis Dyar (not Theobald), U. S. Dept. Agr., Bur. Ent., Circular 72, 3, 1906.

Janthinosoma columbiæ Dyar & Knab, Proc, Biol. Soc. Wash., xix, 135, 1906.

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Grabhamia jamaicensis Theobald (not Theobald), Mon. Culicid., iv, 286, 1907.
Culex (*Grabhamia*) *jamaicensis* Viereck (not Theobald), 1st Ann. Rept. Comm. Health Pa., 471, 1908.
Aëdes columbiæ Thibault, Proc. Ent. Soc. Wash., xii, 16, 1910.
Grabhamia jamaicensis Theobald (in part), Mon. Culic., v, 281, 1910.
Janthinosoma columbiæ Theobald, Mon. Culic., v, 604, 1910.
Aëdes jamaicensis Morse, Ann. Rept. N. J. State Mus., 1909, 717, 1910.

ORIGINAL DESCRIPTION OF JANTHINOSOMA COLUMBIÆ:

As in *J. toltecum* Dyar & Knab, but the abdomen more strongly pale scaled, the third vein with the broad scales in a basal dot only, the scutellum without silvery luster.

59 specimens, Grassymead, Va. (H. G. Dyar); Del Ray and St. Elmo, Va. (F. C. Pratt); Woodstock, Va. (J. Kotinsky); Delair, N. J. (W. P. Seal); Cold Spring Harbor, N. Y. (F. E. Lutz); Greensboro, N. C. (F. C. Pratt); Tutuila, Jackson, Belzoni, Clarksdale, Corbin, Yazoo City, Miss. (H. S. Barber); Agricultural College, Miss. (G. W. Herrick); Baton Rouge, La. (J. A. Morgan).

Type.—Cat. No. 9974, U. S. Nat. Mus.

DESCRIPTION OF FEMALE, MALE, LARVA, PUPA, AND EGG OF PSOROPHORA COLUMBIÆ:

Female.—Proboscis moderate, cylindrical, uniform, labellæ conically tapered; vestiture of small black scales at base and apex, the middle half yellowish white, the edges of this pale area diffused; setæ small, curved, black, those on labellæ more prominently outstanding. Palpi short and stout, about one-fourth as long as proboscis, black scaled with white tips; setæ rather long and black. Antennæ moderate, the basal joints short, the distal ones longer, rugose, pilose, black; tori subspherical, with a cup-shaped apical depression, dark brown, with a cluster of white scales within; hairs of whorls sparse, short, black. Clypeus elliptical, prominent, dark brown, nude. Eyes black. Occiput narrow, convex, blackish, clothed with very narrow, curved white scales with a slight violaceous tinge and many slender, erect, forked black ones, densest on the vertex, at the sides a quadrate patch of broad, flat black scales, followed on the cheeks by broad, flat white scales; setæ along margins of eyes numerous, black.

Prothoracic lobes moderate, elliptical, remote dorsally, blackish, clothed with narrow, curved white scales with a faint violaceous reflection and numerous rather short blackish bristles. Mesonotum blackish brown, with two longitudinal impressed stripes, bare at anterior margin, these and a median stripe darker; vestiture of narrow, curved white scales with a violaceous submetallic reflection interspersed among smaller rich golden brown ones; the bluish scales occur principally in patches on anterior edge, in a distinct spot behind the lateral depressions, along the sides, and bordering the ante-scutellar bare space, but also slightly overspreading the dorsum. Scutellum trilobate, gray, clothed with narrow, curved silvery scales, each lobe with a large group of brown bristles. Postnotum elliptical, prominent, dark brown, nude, slightly pruinose. Pleuræ and coxæ blackish brown, clothed with narrowly elliptical white scales and rows of short black bristles.

Abdomen subcylindrical, flattened, posterior segments tapering; dorsal vestiture of black and yellowish-white scales, the pale scales in large subquadrate, transverse, apical patches, forming an uninterrupted band on the second segment, in the following ones divided on the median line, forming sublateral spots which are sometimes again divided transversely into submedian and posterior spots, the last segment almost wholly black; patches of silvery scales at hind angles of segments, lateral margins continuously white scaled; first segment clothed with dull-whitish scales and with many pale-brown setæ; venter with black and pale scales intermixed, the pale ones predominating, the black ones tending to form median apical spots on distal segments.

Wings rather broad, the membrane hyaline with a smoky tinge; petiole of second marginal cell much shorter than its cell, that of second posterior cell shorter than its cell; basal cross-vein more than its own length from anterior

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cross-vein; veins brownish; scales rather broadly triangular, black and white intermixed, the dark ones predominating; a moderate patch of black scales at base of third vein; outstanding scales ligulate, on terminal portion of wing narrowly lanceolate, mostly dark but with a number of pale ones intermixed; fringe entirely dark. Halteres white, tips slightly dusky.

Legs moderately long, rather stout; femora clothed with black and white scales intermixed, the white ones predominating ventrally, extreme base and apex and a narrow subapical ring white; tibiæ black, with many little white patches; tarsi black, each joint with a white basal ring, first joint with a median one in addition; on the front tarsi the last two joints, on the middle tarsi the last joint entirely black; setæ rather long, coarse and black. Claw formula, 0.0–0.0–0.0.

Length: Body about 5 mm.; wing 4.5 mm.

Male.—Proboscis straight, dark scaled, a narrow pale ring beyond the middle. Palpi exceeding the proboscis by nearly the length of the last two joints, which are long, slightly thickened and upturned; vestiture black, bases of last two joints narrowly white, a bare white ring at the false articulation of the long joint; apex of long joint and last two joints with dense, long black hairs. Antennæ plumose; last two joints long, slender, pilose, the others short, with a thickened black ring at origin of hair-whorl and pale tip; hairs of whorls abundant, long, brown. Coloration similar to the female. Abdomen long, depressed, with long and abundant pale brown lateral ciliation. Wings narrower than in the female, the stems of the fork-cells longer, the scaling on the veins less abundant. Claw formula, 2.1–2.1–0.0.

Length: Body about 5 mm.; wing 3.7 mm.

Genitalia (plate 22, fig. 156): Side-pieces more than twice as long as wide, apical lobe well developed, continuous with side-pieces, forming an apical prominence; no basal lobe. Clasp-filament stout, strongly inflated, mostly on inner side; a rather large terminal articulated spine. Harpes flat, concave, inner margin thickened and revolute, curved over and minutely trifid at tip. Harpagones with a narrow ligulate base, apex triangular, widened and bearing four large smooth setæ with minutely divided apices. Unci approximate, forming a blunt-tipped cone, the margins strongly revolute and approximate medially.

Larva, Stage IV (see figure of the entire larva, plate 59).—Head rounded, wider than long, narrowed before eyes, a slight notch at insertion of antennæ front margin broadly arcuate. Antennæ long, but not extraordinarily so, subcylindrical, slightly tapered, slightly widened at tip, a little curved, sparsely spined all over; a moderate tuft a little before middle; two long subapical spines, a long spine and two digits at tip, the central one larger and broader than the other. Eyes large, transverse, pointed. Upper pair of dorsal head-tufts multiple, lower triple, ante-antennal tuft multiple. Mental plate elongate triangular, longer than wide, a central tooth with thirteen on each side, all much alike, basal ones a little larger. Mandible quadrangular, nearly smooth without; a single filament near tip; an outer row of stout cilia from a distinct collar; six small feathered hairs on outer margin from angular elevations; dentition of four teeth on a process; a filament above, a group of five small irregular ones at base, a long double dentate filament and branched seta within; process below furcate, with patches of hair; six hairs within; nine long setæ at base. Maxilla nearly spherical, divided by a narrow, curved suture; inner half hairy; a line of long hairs at tip; outer half with a large process next the suture and a spine on the other side. Palpus very small, basally placed; four digits small, the two central ones almost obsolete. Thorax rounded, wider than long, robust; hairs abundant but not long, the subdorsal prothoracic ones single. Abdomen stout,

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the anterior segments shorter; lateral hairs of first two segments multiple, double on third to fifth, single on sixth; long single subdorsal hairs on third to fifth segments. Tracheal tubes broad, band-shaped, irregularly flexuous posteriorly. Air-tube large, strongly inflated, tapered on outer half, three times as long as wide; pecten of four teeth scattered over basal half of tube; single tooth a long blunt spine with a simple furcation towards base; a small tuft at outer third of tube. Lateral comb of eighth segment of six scales joined by a basal chitinous band; single scale rectangular, twice as long as wide, with a long terminal spine longer than the body of the scale, a stout, curved subapical spine and three smaller ones on the sides. Anal segment longer than wide, ringed by the plate; dorsal tuft a long hair and brush on each side; a small lateral tuft; ventral brush well developed, extending along the ventral line to base. Anal gills long, twice as long as the segment, regularly tapered to a sharp tip, each with a slight central trachea.

Pupa (plate 149, fig. 706).—Thoracic mass subpyriform, small tufts on anterior edge of mesothorax; air-tubes short, funnel shaped, obliquely truncate at tip; crest of thorax rugose. Abdomen stout, rather short, hairs well developed; a pair of fan-shaped tufts on posterior margin of mesothorax and another on first abdominal segment; long hairs on fourth and fifth segments; three little lateral tufts on seventh segment and one on eighth. Anal paddles with a distinct apical spine.

Egg (plate 146, fig. 672).—Rather large, fusiform, black, reticulated, covered with recumbent spines, one of which arises from the edge of each cell-area.

The eggs are laid on the ground, probably when dry, but in places where water is likely to accumulate. The eggs apparently do not hatch until the following year. They hatch immediately after a heavy rain, and the larvæ develop rapidly. Mr. Herrick has published observations on the life history. He notes that the larvæ appeared in a pool within twelve hours after a rain. They are found in all sorts of ground puddles, but principally in open ones, often without vegetation and muddy. They abound in ditches along roads or railroads, where these are not well graded, especially soon after such places have been made and before they are filled with vegetation. We have not observed the female attacking man in the vicinity of Washington, although the species is common at times. Some of our specimens are filled with blood, but this may be blood of animals other than man. Certainly the species is not a noxious one. Thibault, who has observed the species in Arkansas, makes the following statement: "Quite abundant and annoying near breeding-places. Prefers open fields and large open marshes to woods; often about dwellings; will bite either at midday or perhaps more frequently in evening; very troublesome to live stock; seldom taken indoors. Taken as early as May, but is not abundant until summer as a rule. Seldom taken in fall. Females taken more often than males." Hibernation occurs in the egg-state. We have no observations about the mating habits.

Eastern United States from New York southward.

Cold Spring Harbor, New York, July 17, 1901 (F. E. Lutz); Delair, New Jersey, July 10, 1901 (W. P. Seal); Kanawha Station, West Virginia, July 20, 1907 (A. D. Hopkins); Hyattsville, Maryland, August, 1906 (A. Busck); Washington, District of Columbia (W. V. Warner); Woodstock, Virginia, June 6, 1900 (F. C. Pratt); Grassymead, Virginia, June 21 (H. G. Dyar); Arlington, Virginia, June 25, 1906 (A. Busck); St. Elmo and Del Ray, Virginia, June 7, 1903 (F. C. Pratt); St. Louis, Missouri, May 23, 1904 (A. Busck); Atlanta, Georgia, July 4, 1906 (W. B. Summerall); Greensboro, North Carolina, August, 1901 (F. C. Pratt); Rives, Tennessee, July 27, 1904 (H. S. Barber); Corbin, Kentucky, August 24, 1904 (H. S. Barber); Little Rock,

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Arkansas, July 11, 1904 (H. S. Barber); Scott, Arkansas, October 6, 1908 (J. K. Thibault, Jr.); Agricultural College, Mississippi, June 8, 1903 (G. W. Herrick); Tutwiler, Mississippi, August 2, 1904 (H. S. Barber); Jackson, Mississippi, August 7, 1904 (H. S. Barber); Belzona, Mississippi, August 3, 1904 (H. S. Barber); Clarksdale, Mississippi, July 31, 1904 (H. S. Barber); Yazoo City, Mississippi, August 5, 1904 (H. S. Barber); Johnson's Bayou, Louisiana, July 26, 1906 (J. D. Mitchell); New Orleans, Louisiana, January 7, 1904 (S. G. Gill).

In his early studies of the North American mosquitoes, Mr. D. W. Coquillett identified this species as the *Culex perturbans* of Walker. Later, finding that this identification was erroneous, he adopted the name *Culex confinis*, assuming it to be the *Tæniorhynchus confinnis* of Arribálzaga. Still later he again changed the name, adopting *Culex jamaicensis* of Theobald. Our species is closely related, but, we believe, specifically distinct from the insular form. In fact, that type produces several local forms upon the mainland, which we class as species, correctly, we think, with our present information. These species are *Psorophora texanum, P. floridense, P. toltecum,* and *P. columbiæ.* Consequently we have felt obliged to make a fourth change in the name under which this species is known. If this matter is kept in mind there will not be any difficulty experienced with the confusing synonymy. To show how confusing it is, Dr. Felt, misled by the numerous names, quotes the species twice, once as *Culex jamaicensis,* then finding the name *Culex confinis* in one of Dr. Smith's publications, he supposed that this must be another species, which he quotes as unknown to him, and adds Theobald's description compiled and translated by that author from Arribálzaga's Latin description of specimens from the interior of Argentina. It is entirely improbable that the Argentine species (*confinnis*) has anything to do, even remotely, with any North American species. In fact, it remains unknown today, and probably will so remain until someone procures specimens from that remote locality. Mr. Theobald's subsequent identification of *Tæniorhynchus confinnis* in specimens from Brazil and Trinidad is, we think, incorrect, as he had before him specimens of *Psorophora apicalis* (see p. 599). We have cited this error of Dr. Felt's at some length, as it shows to what extent a matter of misidentification may lead. We could, in fact, pursue this chain of error further, but it is scarcely necessary in this connection, beyond our citations of the literature.

PSOROPHORA INFINE (Dyar & Knab).

Grabhamia confinis Coquillett (not *Taeniorhynchus confinnis* Arribálzaga), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.
Janthinosoma infine Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 181, 182, 1906.
Grabhamia infine Dyar, Proc. Ent. Soc. Wash., viii, 16, 1906.

ORIGINAL DESCRIPTION OF JANTHINOSOMA INFINE:

The characters are normal for the genus. The antennæ are greatly developed, the anal segment short, the scales of the lateral comb of the eighth segment are joined by a very weak chitinous band; the single scale has its apical spinule long. The larvæ were collected by Mr. Busck in Trinidad and St. Domingo in rain water pools and ditches, in a spring in a cave, in a slowly running spring, in a pot-hole in coral rock in the woods, in a pot-hole near the coast with rather salt water and in holes made by wild pigs in the San Francisco Mts. of St. Domingo. The specimens have been named "*Culex confinis*," but *confinis* was described by Arribalzaga from the Argentine and is referred by Blanchard to *Tæniorhynchus;* so we do not accept the identification.

The following is an abstract of the table:

1. Antennæ long and prominent, longer than the head..... 2
2. Anal segment short, shorter than wide..... 4
4. Pecten teeth of the air tube with four long sharp spines..... *infine*

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DESCRIPTION OF FEMALE, MALE, AND LARVA OF PSOROPHORA INFINE:

Female.—Proboscis rather slender, cylindrical, uniform, labellæ conically tapered; vestiture of small black scales, a small ring of white ones at distal third, its edges ill defined, tip of labellæ gray; setæ small, black, curved, those on labellæ more prominently outstanding. Palpi short, stout, about one-fourth as long as proboscis, black scaled, the tips white; setæ rather long, black. Antennæ slender, the joints subequal, rugose, pilose, black; second joint a little longer than the others, pale at its base; tori subspherical, with a cup-shaped apical excavation, brown, a patch of silvery scales on inner side; hairs of whorls rather short, sparse, black. Clypeus elliptical, convex, blackish, nude. Eyes black. Occiput narrow, convex, dark brown, clothed with narrow, curved silvery scales which about half cover the surface and are denser along median line, laterally and along ocular margins, many narrow, erect, forked black ones, at the sides a patch of broad, flat black scales, on the cheeks broad, flat silvery scales; eyes bordered by a row of curved black bristles.

Prothoracic lobes moderate, elliptical, remote dorsally, clothed with narrow, curved white scales and black bristles. Mesonotum deep brown, darker in a pair of submedian stripes and in a spot on lateral areas, a row of black bristles on the dark stripes intensifies their color; vestiture of rather sparse, minute, curved golden-brown scales, a patch of narrow silvery-white ones at anterior angles and a pair of distinct small rounded spots medianly behind lateral depressions, a few silvery scales scattered over the disk, a small patch in front of ante-scutellar bare space and one on each side of this next the scutellum, a silvery spot before roots of wings; bristles black, numerous at roots of wings. Scutellum trilobate, sordid gray, each lobe with a large patch of narrow, curved silvery-white scales and about eight black bristles. Postnotum elliptical, prominent, brown with a slight whitish pruinosity, nude. Pleuræ and coxæ brown, clothed with narrow elliptical, flat white scales and brownish bristles.

Abdomen subcylindrical, flattened, tapering posteriorly, the cerci prominently exserted; vestiture of black scales with brownish luster; apices of segments narrowly margined with flat silvery-white scales, very narrowly interrupted mesially on the second segment, more broadly so on each successive segment, the last wholly black; first segment with a median patch of black scales and with many brown setæ; sides with an irregular row of sordid white scales forming an ill-defined line; venter clothed with whitish-golden scales, except at tip of last segment, which is dark brown; setæ short, black dorsally, golden ventrally.

Wings rather broad, hyaline, iridescent; petiole of second marginal cell much shorter than its cell, that of second posterior cell also shorter than its cell; basal cross-vein rather less than its own length distant from anterior cross-vein; veins brown; scales brownish black throughout, the outstanding ones on apical half of wing narrowly lanceolate. Halteres entirely pale.

Legs moderately long and slender; femora clothed with pale-yellow scales below towards base, the upper side and tips black, extreme base and apex yellowish white, a narrow white ring before apical fourth, a row of white spots on inner side of front and median pairs; tibiæ black, with about nine little white spots along sides; tarsi black, each joint with a narrow pure white basal ring, almost obsolete on fore and middle tarsi and with the last two joints entirely black; broader on the hind tarsi, the last joint with the basal half white. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 3.5 mm.

Male.—Proboscis straight, rather long and slender, slightly thickened towards apex, dark scaled, with a distinct white ring beyond middle. Palpi exceeding the proboscis by nearly the length of the last two joints, which are long, cylindrical, hardly enlarged; vestiture black, a narrow white ring at bases of

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last two joints and before middle of long joint; end of long joint and last two joints with rather short black bristles. Antennæ plumose; last two joints long and pilose, the others short, black at insertions of hair-whorls, paler beyond; hairs of whorls long, dense, blackish brown. Coloration similar to the female. Abdomen elongate, depressed, with abundant, rather coarse, brown lateral ciliation; the narrow white apical segmental bands distinctly divided in the middle, especially posteriorly. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture less abundant. Claw formula, 1.0–1.0–0.0.

Length: Body about 5 mm.; wing 3 mm.

Genitalia (plate 23, fig. 160): Side-pieces more than twice as long as wide, conically tapered, the apical lobe undeveloped, the basal lobe absent; clasp-filament stout, strongly swollen at outer two-thirds with a few minute setæ, a short stout articulated terminal spine. Harpes flat, concave, inner margin thickened and revolute, cleft at tip, forming two teeth directed outwardly. Harpagones with a slender ligulate base and broadly triangular tip bearing six stout setæ on elevated bases. Unci contiguous, forming a slender cone.

Larva, Stage IV (plate 116, fig. 395).—Head rounded, wider than long, narrower before eyes, a notch at insertion of antennæ, front margin broadly arcuate. Antennæ very long, longer than head, subcylindrical, slightly narrower on outer half and a little widened at tip, curved, sparsely spined all over; a large tuft at middle; three long hairs, a short hair, and a digit at tip. Eyes large, transverse, pointed. Upper pair of dorsal head-hairs multiple, lower single; anteantennal tuft multiple. Mental plate triangular, with a central tooth and thirteen on each side, all much alike, basal ones a little more sparsely placed. Mandible quadrangular, a filament and three short hairs before tip; an outer row of cilia; a row of fine hairs from angular prominences on outer margin; dentition of four teeth on a process, the first larger; a spine before, a large double tooth and a fan-shaped divided one at base, a broad coarsely serrate filament and three feathered hairs within; process below furcate, with tufts of hair and a line of hairs running basally; basal angle small; a row of hairs within and a row at base. Maxilla elongate, tip conical, divided by a band-shaped suture; inner half with lines of stiff cilia; a tuft of long hairs at tip; outer half with a single articulated filament next the suture near the middle and a small subapical spine on the other side. Palpus short, thick, with a long apical digit and three short ones. Thorax rounded, wider than long; hairs abundant but not long. Abdomen moderate, the anterior segments shorter; lateral hairs of first two segments multiple, small and double on following segments. Tracheal tubes broad, band-shaped, expanding in tube. Air-tube large, inflated, tapered on outer half, three times as long as wide; pecten of five or six teeth scattered over basal half of tube; single tooth a long spine with very wide base and several shorter basal spines. Lateral comb of eighth segment of six scales; single scale elliptical, with stout, curved outer rim bearing a central stout spine and a stout curved subapical one, with smaller spines between and below. Anal segment not longer than wide, ringed by the narrow plate; dorsal tuft a long hair and brush on each side; a small lateral tuft; ventral brush well developed, extending along ventral line to near base. Anal gills long, longer than the segment, regularly tapered to a sharp tip; each with a slight central trachea.

The larvæ live in ground-pools. Mr. Busck got them in a large pool under an outhouse, twice in pig ponds, once in a slow spring frequented by pigs, and three times in holes in coral rock.

Island of Santo Domingo, West Indies.

San Francisco Mountains, September, 1905 (A. Busck); Santo Domingo (F. E. Campbell); Sanchez (W. J. Zalesky).

We recognize *Psorophora infine* only from Santo Domingo. The specimens cited from Trinidad in the original description belong to *Psorophora cingulatus*.

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PSOROPHORA CINGULATUS (Fabricius).

Culex cingulatus Fabricius, Syst. Antliat., 36, 1805.
Culex cingulatus Robineau-Desvoidy, Mém. Soc. Hist. Nat. Paris, iii, 408, 1827.
Culex cingulatus Wiedemann, Ausser. Zweifl. Ins., 1, 7, 1828.
Culex cingulatus Giles, Gnats or Mosq., 242, 1900.
Taeniorhynchus confinnis Theobald (not Arribálzaga), Mon. Culic., iii, 259, 1903.
Janthinosoma scholasticus Dyar & Knab (not *Culex scholasticus* Theobald), Journ. N. Y. Ent. Soc., xiv, 181, 182, 1906.
Janthinosoma infine Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xiv, 182, 1906.
Grabhamia scholasticus Dyar (not *Culex scholasticus* Theobald), Proc. Ent. Soc. Wash., viii, 16, 1906.
Janthinosoma indoctum Dyar & Knab, Proc. Biol. Soc. Wash., xix, 161, 1906.
Taeniorhynchus confinis Peryassú (not Arribálzaga), Os Culic. do Brazil, 227, 1908.
Culex scholasticus Theobald (in part, not Theobald), Mon. Culic., v, 121, 1910.
Taeniorhynchus confinnis Theobald (not Arribálzaga), Mon. Culic., v, 419, 427, 1910.
Psorophora indoctum Howard, Dyar & Knab, Mosq. N. & Cent. Am. & W. Ind., ii, pl. 142, fig. 614, 1913.

ORIGINAL DESCRIPTION OF CULEX CINGULATUS:

cingulatus. 11. C testaceus, haustello tarsisque posticis albo annulatis.
Habitat in America meridionali Dom. Smidt. Mus. Dom. de Sehestedt.
Statura et magnitudo omnino C. pipientis. Corpus totum testaceum haustello tarsisque posticis albo annulatis.

ORIGINAL DESCRIPTION OF JANTHINOSOMA SCHOLASTICUS Dyar & Knab, not CULEX SCHOLASTICUS Theobald:

Described from the Antilles. Our specimens are from Trinidad, taken by Mr. Busck in rain water pools at Cedros, with the preceding species. We have accepted this identification, although it is perhaps open to some doubt, as Mr. Coquillett later applied this same name (*scholasticus*) to a very different species, collected by the junior author in Central America, which same species he had also named "*secutor* Theob." Not, however, the true *secutor* Theob. of Jamaica, of which we have specimens from Dr. Grabham. (See *Culex lactator* and *C. coronator* described below.)

The following is an abstract of the table:

1. Antennæ long and prominent, longer than the head..... 2
2. Anal segment short, shorter than wide..... 4
4. Pecten teeth of the air tube with two reduced rounded branches *scholasticus*

ORIGINAL DESCRIPTION OF JANTHINOSOMA INDOCTUM:

We propose this name for the larvæ called "*Janthinosoma scholasticus* Theob." (Journ. N. Y. Ent. Soc., xiv, 182, 1906.) The adults resemble closely those of *J. infine* Dyar & Knab, but differ in the ornamentation of the thorax. In *infine* the thorax is dark reddish brown with two white spots on the disk, two at the front margin, faint, and whitish scales on the scutellum; in *indoctum* the thorax is dull brown with yellowish and white scales forming diffuse patches. *Scholasticus* Theobald is a true *Culex*. All the *indoctum* are from Trinidad; all the *infine* from Santo Domingo. The locality "Trinidad" should be erased in our description of *infine*.
22 specimens, Trinidad (F. W. Urich; A. Busck.)
Type.—Cat. No. 10,026, U. S. Nat. Mus.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF PSOROPHORA CINGULATUS:

Female.—Proboscis slender, subcylindrical, uniform, labellæ conically tapered; vestiture of small black scales, a small ring of white ones at distal third, its edges ill defined, tip of labellæ grey; setæ small, black, curved, those on labellæ more prominently outstanding. Palpi short, stout, about one-fourth as long as proboscis, black scaled, the tips white; setæ rather long, black. Antennæ slender, the joints subequal, rugose, pilose, black; second joint a little longer than the others, pale basally; tori subspherical, with a cup-shaped apical excavation, blackish; hairs of whorls short, sparse, black. Clypeus elliptical, convex, brown, nude. Eyes black. Occiput narrow, convex, dark brown, clothed with narrow, curved silvery-whitish scales which about half cover the surface, denser on ocular margin, and many long and slender, erect, forked black ones;

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at the sides a patch of broad, flat black scales, the cheeks covered with broad, flat, silvery white scales; eyes bordered by a row of curved black bristles.

Prothoracic lobes moderate, elliptical, remote dorsally, clothed with narrow, curved white scales and with black bristles. Mesonotum uniformly rich dark brown, a median and sublateral rows of black bristles; vestiture of sparse, minute, curved golden-brown scales, a diffused patch of larger silvery-white ones at anterior angles, medianly a pair of large, diffused, transverse patches behind and above the lateral depressions, some of these silvery scales scattered over the disk, a large patch in front of the ante-scutellar bare space, and one on each side of this next the scutellum, another over the roots of the wings; bristles black, numerous at roots of wings. Scutellum trilobate, dull luteous, each lobe with a large patch of narrow, curved silvery-white scales and about eight black bristles. Postnotum elliptical, prominent, dark brown with a slight whitish pruinosity, nude. Pleuræ and coxæ brown, clothed with narrow, elliptical, flat white scales and brownish bristles.

Abdomen subcylindrical, flattened, tapering posteriorly, the cerci prominently exserted; dorsal vestiture of black scales with a brown luster, the apices of the segments with narrow silvery-white bands interrupted in the middle, each succeeding one more broadly so, last segment wholly black; first segment with a median patch of black scales and with many pale hairs; sides with an irregular row of white scales forming an ill-defined line; venter clothed with whitish-golden scales, except sides at last segment, which are dark brown; setæ short, black dorsally, golden ventrally.

Wings rather broad, hyaline, iridescent; petiole of second marginal cell shorter than its cell, that of second posterior cell also shorter than its cell; basal cross-vein rather less than its own length distant from anterior cross-vein; veins brown; scales brownish black throughout, outstanding ones narrowly ligulate, those on fork of second vein denser and narrowly lanceolate. Halteres entirely pale.

Legs moderately long and slender; femora clothed with pale-yellow scales below towards base, upper side and tips black, extreme base and apex white, a narrow white ring before apical fourth; tibiæ black, with about nine little white spots along sides, the anterior pair with only a few white spots; tarsi black, each joint with a narrow white basal ring which is almost obsolete on fore and middle tarsi, the last two joints being entirely black, last joint of hind pair with the basal third white. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 3.5 mm.

Male.—Proboscis straight, black scaled, with a narrow white ring beyond middle. Palpi exceeding the proboscis by nearly the length of the last two joints, which are long, subcylindrical, hardly enlarged; vestiture black, with a narrow white ring at base of last two joints and near middle of long joint; end of long joint and last two joints with rather short black hairs. Antennæ plumose, the last two joints long and pilose, the others short, black at insertions of hair-whorls and whitish beyond; hairs of whorls long, dense, brown. Coloration similar to the female. Abdomen long, depressed; the silvery apical segmental bands much broader than in the female and distinctly divided in the middle, especially posteriorly, the last segment with a large silvery-white apical patch; lateral ciliation long and abundant, brown. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture less abundant. Claw formula, 1.0–1.0–0.0.

Length: Body about 5 mm.; wing 3 mm.

Genitalia (plate 22, fig. 157): Side-pieces more than twice as long as wide, conically tapered, apical lobe prominent, triangular, basal lobe absent; clasp-filament stout, strongly swollen medially, reticulate, a moderate stout articulated terminal spine. Harpes flat, concave, inner margin thickened and revolute,

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cleft at tip, forming two teeth directed outwardly. Harpagones with a slender ligulate base and broadly triangular tip bearing six stout setæ on elevated bases. Unci contiguous, forming a stout cone.

Larva, Stage IV.—Head rounded, wider than long, narrowed before the eyes, a slight notch at insertion of antennæ, front margin broadly arcuate. Antennæ very long and prominent, spined all over; a large tuft before middle arising from a slight notch; two spines before tip, another spine, a short spine and a digit at apex. Eyes large, transverse, pointed. Mental plate elongate triangular, with a central tooth and fourteen on each side, becoming more remote and pointed basally, the last one minute and remote. Mandible quadrangular; a filament and small tuft of hairs before tip; an outer row of cilia from a collar; a row of small simple hairs from angular projecting bases along outer margin; dentition of four teeth on a small process, first and fourth longest; a large tooth at base, with a row of small serrations, a long serrate filament, and two short feathered hairs within; process below elongate, furcate; a row of hairs along its outer margin; basal angle slight, with a row of five hairs within; a row of long hairs at base. Maxilla rounded elliptical, divided by a broad crooked suture, inner half covered with coarse spines; a tuft of coarse hairs at tip; outer half with a single articulated filament at bend of suture, a spine on other side. Palpus stout, short, with four irregular terminal digits. Thorax rounded, wider than long, robust; hairs abundant but not long. Abdomen stout, anterior segments shorter; lateral hairs of first two segments multiple, double on third to fifth, single on sixth. Tracheal tubes broad, band-shaped. Air-tube large, strongly inflated, tapered at outer half, three times as long as wide; pecten of four teeth scattered over basal third of tube; single spine long, with one or two basal branches. Lateral comb of eighth segment of six separate scales; single scale elliptical, with a long stout terminal spine and a subterminal one on each side, less than half as long as terminal one. Anal segment wider than long, ringed by the plate; dorsal tuft a long hair and brush on each side; a small lateral tuft; ventral brush well developed, extending along ventral line to base. Anal gills long, twice as long as the segment, tapered to a sharp tip; each with a slight central trachea.

The larvæ occur in ground-pools. Mr. Busck got them in an open pool near a village and in low, open pools in a sugar-cane field.

North Coast of South America, Island of Trinidad.

Cedros, Trinidad, June 14, 1905 (A. Busck); San Juan, Trinidad, June 7, 1905 (A. Busck); Trinidad (F. W. Urich). Reported from South America (Fabricius) and British Guiana (Theobald).

Psorophora cingulatus is extremely close to *Psorophora apicalis* (Theobald) (*Culex apicalis* Theobald, Mon. Culic., iii, 171, 1903), of which we possess a specimen from Brazil, by the kindness of Dr. Arthur Neiva. There is a slight difference in the shape of the wing-scales, those of the present species being blunt at the tip, while those of *apicalis* are pointed. We feel obliged to keep the species separate, although we doubt very much whether they are not really only geographical forms. We can not observe any other differences between the forms. Theobald's identification of the species treated here with Arribálzaga's *Taeniorhynchus confinnis* we do not accept on account of the geographical discontinuity. If either species is the same as the Argentine one, it should be *apicalis* and not *cingulatus*. We think, however, that neither is so and that the Argentine form, when rediscovered, will prove abundantly distinct from both. Dr. Neiva has examined Fabricius' type of *cingulatus* and writes us that he is convinced that it is the same as *apicalis* Theobald. Owing to the geographical distribution of these forms, and to the fact that the type of *cingulatus* probably came from the Guianas, we feel obliged to consider *cingulatus* as referring to the northern form which we called *indoctum* rather than to the southern *apicalis*. The figure

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of the thoracic ornamentation given by Theobald (Mon. Culic., iii, 260, fig. 137) is entirely misleading as it shows a well-defined pattern. Such is not the case: not only are the markings of silvery scales very diffused, but their distribution is also very different. We have figured the mental plate of the larva in this work, vol. 2, pl. 142, fig. 614, under the name *Psorophora indoctum*. Dyar and Knab at first applied the specific name *scholasticus*, furnished them by Coquillett, to this species. It developed later that this determination resulted through an error in the association of adults and larvæ, the adults proving to be *Culex similis*, while the larvæ were those of this species. Coquillett added to the confusion by referring to the genus *Grabhamia* the wrongly associated adults of *Culex* (U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906).

PSOROPHORA PYGMÆA (Theobald).

Grabhamia pygmæa Theobald, Mon. Culic., iii, 245, 1903.
Culex nanus Coquillett, Can. Ent., xxxv, 256, 1903.
Culex nanus Pazos, Bull. Soc. Ent. France, 134, 1904.
Taeniorhynchus antiguæ Giles, Journ. Trop. Med., vii, 382, 384, 1904.
Culex nanus Coffin, in Shattuck, The Bahama Ids., 284, 1905.
Grabhamia pygmæa Theobald and Grabham, Mosq. or Culic. of Jamaica, 31, 1905.
Grabhamia pygmæa Blanchard, Les Moust., 397, 1905.
Culex nanus Blanchard, Les Moust., 629, 1905.
Taeniorhynchus antiguæ Blanchard, Les. Moust., 631, 1905.
Janthinosoma pygmæa Dyar & Knab, Proc. Biol. Soc. Wash., xix, 162, 1906.
Grabhamia pygmæus Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.
Grabhamia pygmæa Theobald, Mon. Culic., iv, 289, 1907.
Aëdes pygmeus Pazos, San. y Ben., ii, 47, 318, 1909.
Grabhamia pygmæa Theobald, Mon. Culic., v, 281, 1910.

ORIGINAL DESCRIPTION OF GRABHAMIA PYGMÆA:

Differs from the former [*Grabhamia jamaicensis*] in the following characters: Thorax mottled with dark brown, bright brown, and creamy scales, the dark brown forming more or less distinct spots and a median line in front; the metatarsi show no traces of median banding; there is no trace of the small black spot at the base of the third long vein, and the wing scales are shorter and rather broader, and the specimens are about half the size of *Jamaicensis*. The apical bands on the abdomen are as in the former species, but are much whiter.

The wing is as follows: Fork-cells short, the first sub-marginal a little longer and narrower than the second posterior; base of the first sub-marginal cell about level with the base of the second posterior cell; stem of the first sub-marginal cell a little more than half the length of the cell; stem of the second posterior nearly two-thirds the length of the cell; posterior cross-vein about its own length behind the mid cross-vein; elongate lateral scales on the apex of the first, the third, fourth, and fifth veins; broad ones elsewhere.

Habitat.—Antigua (Forrest); and Jamaica (Grabham).

Time of capture.—August (Forrest); March (Grabham).

Observations.—Described from a series sent by Mr. Forrest. The rather short and broad wing scales on the branches of the second fork-cell and its stem are shown in Plate XI.

ORIGINAL DESCRIPTION OF CULEX NANUS:

Female. Near *jamaicensis*, but much smaller, the light-coloured scales on the tibiæ not collected into spots, mesonotum without round spots of yellowish scales, etc. Black, the base of the antennæ except the first joint, a band at middle of proboscis, the halteres and bases of femora yellow; scales and hairs of palpi black, appressed scales of occiput golden yellow, the upright ones black, scales of mesonotum golden yellow, those of the abdomen black and with a broad crossband of whitish ones on the hind margin of each segment, the last two segments nearly wholly whitish scaled; scales of venter white, those of femora and tibiæ mixed black and whitish, the latter forming a ring near three-fourths the length of each femur, scales of tarsi black, those at narrow bases of the joints whitish, tarsal claws simple; wings hyaline, the scales mixed black and white, the black ones not collected into spots, lateral scales of the anterior veins narrowly lanceolate, those of the other veins

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almost linear; length, 3 mm. Four specimens collected at Key West, Florida, in August, 1901, by Mr. August Busck, and six by Mr. E. A. Schwarz, April 1 to 3, 1903.

Type.—No. 6893, U. S. National Museum.

ORIGINAL DESCRIPTION OF TÆNIORHYNCHUS ANTIGUÆ:

♀. Head dark grounded, with straw-coloured, curved and erect forked scales on occiput and nape, and the lateral flat-scaled areas brindled black and yellow; palpi almost entirely dark scaled. Pleurae not spotted. Legs and proboscis more or less brindled throughout. Venter black, with narrow snowy apical bands. Of medium size.

Habitat.—Antigua.

Somewhat resembles my *Tæniorhynchus ager*, but the abdominal banding is quite different. The proboscis wants the yellow tip, and its middle band is much broader. The subapical bands on the thighs are also very characteristic.

The following is an abstract of table:

I. Species whose proboscides exhibit a paler band.
  B. With the wings brindled but not actually spotted.
    b. With the abdomen apically pale banded.
      1. With the tarsi basally pale banded.
        6. *T. Antiguæ*, Giles. Wing brindled throughout with about equally distributed black and pale yellow scales, the latter almost forming spots on some inner veins. Inner rank fringe scales alternately light and dark. Band on proboscis broad yellow, not sharply defined, placed in middle. Abdominal segments dark, with conspicuous triangular apical snowy bands, and occasionally some lateral spots in front. All tarsal joints except last two of fore and mid pairs with narrow yellow basal bands. Thorax dark, with golden-brown curved scales. A sombre species, with snowy apical bands on the dark venter and a pale subapical band to all the femora.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF PSOROPHORA PYGMÆA:

Female.—Proboscis moderately long and slender, uniform, labellæ conically tapered; vestiture of black scales, a broad ring of white ones at middle, its edges ill defined, tip of labellæ grey; setæ small, black, curved, those on labellæ more prominently outstanding. Palpi short, stout, nearly one-fourth as long as proboscis, black scaled, the tips and a few scattered scales white; setæ rather long, black. Antennæ rather short and stout; joints subequal, rugose, pilose, blackish, paler proximally; second joint a little longer than the others; tori subspherical, blackish, with a cup-shaped apical excavation and many narrow, curved silvery white scales on inner side; hairs of whorls short, sparse, black. Clypeus elliptical, convex, blackish, nude. Eyes black. Occiput narrow, convex, blackish, clothed with narrow, curved, yellowish silvery scales which about half cover the surface and many narrow, erect, forked black ones; at the sides a patch of small, flat, broad black scales at eye-margin, surrounded and followed by flat, broad white scales; eyes bordered by a row of curved black bristles.

Prothoracic lobes moderate, elliptical, remote dorsally, clothed with narrow curved yellowish silvery scales and black bristles. Mesonotum blackish, two bare spots on anterior margin, a subdorsal and a sublateral row of black bristles; vestiture of dense, narrow, curved pale golden and golden-brown scales, the pale ones predominating, nearly silvery on lateral parts of disk; antescutellar bare spot small, surrounded by silvery scales; bristles black, numerous at roots of wings. Scutellum trilobate, brown, clothed with narrow, curved, pale-golden scales and each lobe with about eight black bristles. Postnotum elliptical, prominent, dark brown with a slight whitish pruinosity, nude. Pleuræ and coxæ brown, clothed with narrow, elliptical, flat white scales and with rows of brownish bristles.

Abdomen subcylindrical, flattened, tapering posteriorly, cerci prominently exserted; dorsal vestiture of black scales mixed with a few whitish ones, the

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apical halves of segments with flat white scales which form a continuous band, wider in the middle and diffused on the last two segments; sides with an irregular row of white scales forming an indefinite line; first segment clothed with white scales and with many pale hairs; venter clothed with sordid-white scales, with a few black ones subapically, on seventh segment forming lateral dark brown spots; setæ short, black dorsally, golden ventrally.

Wings rather broad, hyaline, iridescent; petiole of second marginal cell shorter than its cell; that of second posterior cell shorter than its cell; basal cross-vein rather less than its own length distant from anterior cross-vein; veins brown; scales black and white intermixed, the black ones predominating, those along veins small, broad, triangular, the outstanding ones on apical half of wing sparse, very narrow, dusky. Halteres entirely pale.

Legs moderately long and slender; femora clothed with white scales below towards base, upper side and tips with black and few white scales intermixed, extreme base and apex yellowish-white, a narrow white subapical ring; tibiæ black with white scales evenly intermixed, not forming spots; tarsi black, basally with white scales intermixed, each joint with a narrow white basal ring, on fore and middle tarsi almost obsolete and with the last two joints entirely black. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 3.5 mm.

Male.—Proboscis straight, uniform, a narrow yellowish white ring beyond middle. Palpi exceeding the proboscis by nearly the length of the last two joints, which are long, subcylindrical, hardly enlarged, upturned; vestiture black, a narrow white ring at bases of last two joints and near middle of long joint; end of long joint and last two joints with abundant, rather short, brown hairs. Antennæ plumose, the last two joints long and pilose, the others short, black at insertions of the hair-whorls, whitish beyond; hairs of whorls long, dense, brown. Coloration similar to the female. Abdomen long, slender, depressed beyond middle, the white apical segmental bands narrower than in the female, the last one divided in the middle; lateral ciliation long and abundant, pale brown. Wings much narrower than in the female, the stems of the fork-cells longer, the vestiture less abundant. Claw formula, 1.0–1.0–0.0.

Length: Body about 5 mm.; wing 3 mm.

Genitalia (plate 21, fig. 151): Side-pieces more than twice as long as wide, conically tapered, apical lobe undeveloped, basal lobe absent; clasp-filament stout, strongly swollen medially, a short, stout, articulated terminal spine. Harpes flat, concave, inner margin thickened and revolute, cleft at tip, forming two teeth directed outwardly. Harpagones with a slender ligulate base and broadly triangular tip bearing six stout setæ on elevated bases. Unci contiguous, forming a stout, truncate-tipped cone.

Larva, Stage IV (plate 116, fig. 396).—Head transverse, widest through eyes; antennæ rather long, slender, with small spines, a small tuft before the middle. Both pairs of dorsal head-hairs single, ante-antennal tuft in fours. Lateral comb of eighth segment of six scales on a weak chitinous plate, each scale with spinules at margin and a long central spine. Air-tube inflated, fusiform, over three times as long as width at base, the pecten of six or seven teeth, closely placed except the last one; tuft minute, before apical third. Anal segment longer than wide, ringed by a chitinous band; dorsal tuft of a long hair and tuft on each side; ventral brush well developed, running along ventral line nearly to base. Anal gills long, tapering, equal.

The larvæ develop rapidly in temporary puddles. Dr. Grabham obtained eggs from captured females. The eggs were laid separately upon the surface of water. They were "comparatively large, about ¼ mm. long, and somewhat narrow and covered with hollow papillæ curved at their apices towards the narrow

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end of the ovum. The air chambers are quite different to those in *Stegomyia fasciata* [*Aëdes calopus*] ova." The larvæ hatched in two days, and were fully grown in eight days. They are probably capable of more rapid growth under natural conditions. We believe that under natural conditions the eggs are not deposited upon the water, but as in the other species of the genus, upon the ground. The larvæ sent us by Dr. Grabham came from pools on the Spanish Town road, near Kingston. We assume from the long anal gills that the larvæ occur in fresh water.

Antilles and southern Florida.

Kingston, Jamaica, October 10, 1903, April, 1906 (M. Grabham); Havana, Cuba, October (J. R. Taylor); Guantanamo Bay, Cuba, May 31, 1904 (A. C. H. Russell); Nassau, Bahamas, June 24, 1903 (T. H. Coffin); Andros, Bahamas, June 27, 1903 (T. H. Coffin); Cat Island, Bahamas (T. H. Coffin); Tarpum Bay, Bahamas (T. H. Coffin); Key West, Florida, August, 1901 (A. Busck), April 1-3, 1903 (E. A. Schwarz).

Also reported from Antigua (Theobald, Giles).

We possess no specimens of *Psorophora pygmæa* from the island of Antigua, which is the type locality for the names *pygmæa* and *antiguæ*. If the receipt of specimens from that locality should prove that these are a distinct species, the present form will be known as *Psorophora nanus*. With such closely allied and variable species as those under consideration, it is impossible to tell from descriptions whether the Antiguan form is the same as the one before us or not.

The larva which we have described and figured was received from Dr. Grabham in a mixed culture, and it is therefore possible that we have not correctly identified it, although we think that it is correct.

PSOROPHORA HARUSPICUS (Dyar & Knab).

Aëdes haruspicus Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 56, 1908.
Aëdes haruspicus Theobald, Mon. Culic., v, 620, 1910.

ORIGINAL DESCRIPTION OF AËDES HARUSPICUS:

Female.—Proboscis rather short, slender, brown-scaled, with a sprinkling of lighter ones, a light ring near the middle; palpi dark-scaled; occiput clothed mostly with whitish scales and with four quadrate patches of darker scales; mesonotum bright brown-scaled, mottled with patches of white scales, these white scales densest in the region before the scutellum; scutellum clothed with shining whitish scales; scales of the pleura white; abdomen black-scaled above, with broad apical soiled white bands on all but the last segment; beneath mottled, with dull whitish and light brown scales, the segments becoming lighter apically, but without defined bands; femora and tibiæ black-scaled, with a sprinkling of lighter scales, a whitish ring on each femur toward the apex; tarsi black, with white basal rings, becoming successively narrower on each joint; wings broad, the scales on the veins black and white, giving a mottled effect; claws simple. Length, 3.5 mm.

Male.—The abdominal bands are clearer white and narrower than in the female; otherwise the coloration is similar.

Twenty-one specimens, Port Antonio, Jamaica, bred from the larvæ in seaside pools, November 15, 1906. (M. Grabham.)

Type.—Cat. No. 11995, U. S. N. M.

We expected that Doctor Grabham would himself describe this species, but after the destruction of his collection by the earthquake he has requested us to describe it from the specimens he had previously sent us.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF PSOROPHORA HARUSPICUS:

Female.—Proboscis moderate, cylindrical, uniform, labellæ conically tapered; vestiture of small black scales, a broad ring of white ones at middle, its edges ill defined, some of the white scales scattered nearly to apex, tip of labellæ gray, setæ small, black, curved, those on labellæ more prominently outstanding. Palpi short, stout, about one-fourth as long as proboscis, black scaled, no white scales at tip of last joint; setæ rather long, black. Antennæ rather short and

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stout, the joints subequal, rugose, pilose, black; second and third joints luteous, the second longer than the others, the third shorter; tori subspherical, with a cup-shaped apical excavation, brown, with a group of narrow white scales on inner side; hairs of whorls very short, sparse, black. Clypeus elliptical, convex, brownish, nude. Eyes black. Occiput narrow, convex, dark brown, clothed with narrow, curved, silvery scales, which about half cover the surface, and many narrow, erect, forked, black ones with bronzy luster; at the sides a small patch of flat, broad black scales, followed on the cheeks by flat, broad white scales; eyes bordered by a row of curved black bristles.

Prothoracic lobes moderate, elliptical, remote dorsally, clothed with narrow curved white scales and black bristles. Mesonotum deep brown, faintly darker in a pair of rather broad submedian stripes and on the lateral areas, vestiture of narrow, curved, silvery-white scales and golden-brown ones in ill-defined patches medianly, on the lateral depressions and above the roots of the wings; bristles black, numerous at the roots of the wings. Scutellum trilobate, brown, each lobe with a large patch of narrow curved silvery-white scales and about eight black bristles. Postnotum elliptical, prominent, dark brown with a slight whitish pruinosity, nude. Pleuræ and coxæ brown, clothed with narrow, elliptical, flat, white scales and brownish bristles.

Abdomen subcylindrical, flattened, tapering posteriorly, the cerci prominently exserted; dorsal vestiture of dull black scales mixed with dark brown ones, the apical thirds or more of segments with flat white scales which form irregular bands, first segment with a small median patch of white scales and densely hairy, sixth segment with an incomplete white band, seventh wholly black; venter clothed with whitish-golden scales, sides of seventh segment dark brown scaled; setæ short, black dorsally, golden ventrally; cerci black.

Wings moderate, hyaline, iridescent; petiole of second marginal cell longer than its cell, that of second posterior cell equal to its cell; basal cross-vein rather less than its own length distant from anterior cross-vein; veins brown; scales black and white intermixed, the black ones predominating, the recumbent scales ligulate and narrowly cuneiform, the outstanding ones very narrowly lanceolate, smoky; fringe unicolorous, blackish. Halteres entirely pale.

Legs moderate; femora clothed with pale and yellow scales below towards base, upper side and tips black with white intermixed, extreme base and apex yellowish-white, a narrow white subapical ring; tibiæ black with white scales intermixed, not forming spots; tarsi black, with some whitish scales basally, each joint with a white basal ring, broad on second and third joints of hind tarsi, almost obsolete on fore and middle tarsi, the last two joints being entirely black. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 3 mm.

Male.—Proboscis straight, uniform, with a broad, ill-defined pale ring from basal third to near tip. Palpi exceeding the proboscis by nearly the length of the last joint, last two joints subcylindrical, not enlarged; vestiture black, with white rings at bases of last two joints and before middle of long joint; end of long joint and last two joints with long, dense, black and luteous hairs. Antennæ plumose; last two joints long and pilose, the others short, black at insertions of the hair-whorls, whitish beyond; hairs of whorls long and dense, brown with golden luster. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture less abundant. Abdomen elongate, with long, dense, pale, lateral ciliation; the broad white apical segmental bands somewhat diffused especially posteriorly. Claw formula, 1.0–1.0–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

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Genitalia (plate 23, fig. 159): Side-pieces more than twice as long as wide, conically tapered, apical lobe slightly developed, forming a small angulation, basal lobe absent; clasp-filament stout, strongly swollen medially, with a few minute setæ, a short stout articulated terminal spine. Harpes flat, concave, inner margin thickened and revolute, divided at tip, forming three teeth directed outwardly. Harpagones with a slender ligulate base and broadly triangular tip bearing four stout setæ on elevated bases. Unci contiguous, forming a slender cone with divided tip.

Larva, Stage IV (plate 116, fig. 398).—Head rounded, transverse, widest and bulging in region of eyes; antennæ rather small and slender, scarcely spinose, the tuft moderate, before middle, two of the apical spines well removed from tip; upper pair of dorsal head-hairs small, in fours, lower pair longer, double; ante-antennal tufts in fives. Lateral comb of eighth segment of six separate scales, fringed with spines, the middle one longest. Air-tube inflated, fusiform; pecten of two subbasal teeth; hair-tuft obsolete; terminal hooks small. Anal segment longer than wide, the chitinous ring about as long as wide, weakly chitinized; dorsal hairs a long hair and tuft on each side; ventral brush well developed, running along ventral line nearly to base. Anal gills very short, rounded, equal.

Dr. Grabham bred the larvæ from seaside pools in coral rock. We assume from the abortive anal gills of the larvæ that the water in these pools was saline. These pools were probably of a temporary character, for the species of *Psorophora* are not continuous breeders and we believe the present species is no exception.

Island of Jamaica, West Indies.

Port Antonio, November 15, 1906 (M. Grabham).

PSOROPHORA INSULARIUS (Dyar & Knab).

Grabhamia pygmæus Dyar (not Theobald), Proc. Ent. Soc. Wash., viii, 16, 1906.
Grabhamia pygmæus Coquillett (in part, not Theobald), U. S. Dept. Agric., Bur. Ent., Tech. Ser. 11, 21, 1906.
Janthinosoma pygmæa Dyar & Knab (not *Grabhamia pygmaea* Theobald), Journ. N. Y. Ent. Soc., xiv, 182, 1906.
Janthinosoma insularius Dyar & Knab, Proc. Biol. Soc. Wash., xix, 135, 1906.
Janthinosoma insularius Dyar & Knab, Proc. Biol. Soc. Wash., xix, 161, 1906.
Janthinosoma insularius Theobald, Mon. Culic., v, 604, 1910.

ORIGINAL DESCRIPTION OF JANTHINOSOMA INSULARIUS:

Hind legs without raised scales; tarsi with pale bands; first hind tarsal joint without a white ring; wings with whitish and dark scales intermixed; legs pale, the yellowish scales predominating. Else as in *J. pygmaeus* Theobald.

8 specimens, Santo Domingo, W. I. (A. Busck).

Type.—Cat. No. 9975, U. S. Nat. Mus.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF PSOROPHORA INSULARIUS:

Female.—Proboscis moderate, cylindrical, uniform, labellæ conically tapered; vestiture of black scales with white ones intermixed, a very broad ring of yellowish-white ones at middle, its edges ill defined; setæ small, black, curved, those on the labellæ more prominently outstanding. Palpi short, stout, about one-fourth as long as proboscis, black scaled, with a few white scales basally; setæ rather long, black. Antennæ rather short and stout, the joints subequal, rugose, pilose, black; second joint thickened and a little longer than the others, luteous, the next two shortened, brown; tori subspherical, with a cup-shaped apical excavation, brown, with a patch of broad white scales on inner side; hairs of whorls very short, sparse, black. Clypeus elliptical, convex, blackish, nude. Eyes black. Occiput narrow, convex, dark brown, clothed with narrow, curved, shining white scales, which about half cover the surface, and many short erect forked brown ones; at the sides a small patch of flat, broad black scales sur-

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rounded and followed on the cheeks by flat, broad white scales; eyes bordered by a row of curved black bristles.

Prothoracic lobes moderate, elliptical, remote dorsally, clothed with narrow, curved, white scales and black bristles. Mesonotum brown, darker in a pair of rather broad, diffused submedian stripes and on the lateral areas, subdorsal and sublateral rows of black bristles; vestiture of narrow, curved silvery-white scales, a rather broad, ill-defined, dorsal stripe of golden-brown scales and large patches of the same color on the lateral depressions and above roots of wings; bristles black, numerous at roots of wings. Scutellum trilobate, brown, each lobe with a large patch of narrow curved silvery-white scales and about eight brown bristles. Postnotum elliptical, prominent, dark brown with a slight whitish pruinosity, nude. Pleuræ and coxæ brown, clothed with narrow, elliptical, flat, white scales and brownish bristles.

Abdomen subcylindrical, flattened, tapering posteriorly, the cerci prominently exserted; dorsal vestiture of black scales and dark brown scales, with broad, irregular, apical segmental bands of dull white scales, medianly more or less produced and occupying nearly half the segments; first segment with a patch of white scales and many pale hairs; seventh segment with the white irregularly distributed and predominating; sides with an irregular row of white scales forming an indefinite line; venter clothed with whitish-golden scales with some dark scales intermixed; setæ short, black dorsally, golden ventrally; cerci black.

Wings rather broad, hyaline, iridescent; petiole of second marginal cell slightly longer than its cell, that of second posterior cell about equal to its cell; basal cross-vein rather less than its own length distant from anterior cross-vein; veins brown; scales brown and white intermixed, the dark ones predominating, recumbent scales rather broad, truncate and subtruncate, the outstanding scales on apical half of wing ligulate and narrowly lanceolate, brown. Halteres entirely pale.

Legs moderate; femora clothed with whitish scales below towards base, upper side to tips black mixed with white scales, extreme base and apex white, a narrow white subapical ring; tibiæ with black and white scales above, entirely white below; tarsi black with pale scales intermixed, each joint with a very narrow yellowish-white basal ring which is almost obsolete on fore and middle tarsi, the last two joints being entirely black. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Male.—Proboscis straight uniform, with an ill-defined pale ring beyond middle. Palpi long, exceeding the proboscis by about the length of the last joint, last two joints subcylindrical, hardly enlarged; vestiture black with white scales intermixed, a narrow white ring at the false articulation of the long joint; end of long joint and the last two joints with long, dense brownish hairs. Antennæ plumose; last two joints long and pilose, the others short, black at insertions of hair-whorls, whitish beyond; hairs of horls long and dense, brown with yellow luster. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture less abundant. Abdomen elongate, depressed, the broad white apical segmental bands diffused posteriorly, the last two segments entirely white; lateral ciliation long, brownish yellow. Claw formula, 1.0–1.0–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 21, fig. 152): Side-pieces more than twice as long as wide, conically tapered; apical lobe slightly developed, forming a slight inner angle; basal lobe absent. Harpes flat, concave, inner margin thickened and revolute, divided at tip, forming several teeth directed outwardly. Harpagones small, with a slender ligulate base and slightly expanded tip bearing four stout setæ. Unci contiguous, forming a stout cone with rounded tip.

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Larva, Stage IV (plate 116, fig. 399).—Head rounded, wider than long, narrowed before eyes, a slight notch at insertion of antennæ, front margin broadly arcuate; both pairs of dorsal head-hairs in threes. Antennæ short and slender, smooth, a small tuft at middle; two long spines before tip, beyond which the shaft is somewhat bent and narrowed and carries an apical spine and two digits. Eyes large, transverse, pointed. Mental plate triangular, excavated at base, a central tooth, and nine on each side, the basal ones a little more remote and sharper. Mandible quadrangular, a filament and a hair before tip; an outer row of cilia; a row of fine hairs from angular prominences on outer margin; dentition of four nearly equal teeth on a process; a tooth before, a broadly triangular one at base, and two broad, deeply serrate filaments within; process below slender, furcate, with lines of hairs; basal angle sharp; a row of coarse hairs within and one at base. Maxilla elongate, divided by a band-shaped suture; inner half with rows of stout cilia; a tuft of long hairs at tip; outer half with a single articulated filament next the suture; palpus about half as long as maxilla, with two large and two small terminal digits. Thorax rounded, wider than long; hairs abundant but not long. Abdomen moderate, anterior segments shorter; lateral tufts of first two segments multiple, the following ones small and short. Tracheal tubes broad, band-shaped. Air-tube large, inflated, elliptical in outline, nearly three times as long as broad; pecten of two or three teeth on the basal third; single tooth a spine with broad base and one or two basal branches. Lateral comb of eighth segment of six separate scales; single scale elliptical, with heavy outer margin, a long apical spine, a slightly curved subapical one and shorter ones between and below. Anal segment longer than wide, ringed by the weakly chitinized plate; dorsal hairs a long hair and brush on each side; ventral brush well developed, extending along ventral line nearly to base. Anal gills short, rounded, shorter than the segment.

The larvæ live in salt water in rock-holes on the seashore. Mr. Busck found them in distinctly brackish water "right at the ocean, below the land edge," in clear water.

Island of Santo Domingo, West Indies.

South shore of Santo Domingo, July 11, 1905 (A. Busck).

This species represents the Jamaican *haruspicus* in Santo Domingo, both species living in brackish water in rock-holes near the sea. The two species are allied to the more generally distributed *pygmæa*, but are more specialized in habit, *pygmæa* being an inhabitant of general rain-filled ground-pools.

Genus AËDES Meigen.

Aëdes Meigen, Syst. beschr. bek. Eur. Zweifl. Ins., i, 13, 1818.
Culex (in part) Lynch Arribálzaga, Rev. Mus. de La Plata, i, 373, ii, 157, 1891.
Heteronycha Lynch Arribálzaga, Rev. Mus. de La Plata, i, 373, ii, 155, 1891.
Ochlerotatus Lynch Arribálzaga, Rev. Mus. de La Plata, i, 374, ii, 143, 1891.
Taeniorhynchus Lynch Arribálzaga, Rev. Mus. de La Plata, i, 374, ii, 147, 1891.
Aëdes Townsend, Trans. Am. Ent. Soc., xix, 149, 1892.
Culex (in part) Giles, Gnats or Mosq., 186, 1900.
Aëdes (in part) Giles, Gnats or Mosq., 343, 1900.
Stegomyia Theobald, Journ. Trop. Med., iv, 159 (foot-note), 1901.
Stegomyia Theobald, Liverp. School Trop. Med., Mem. iv, app., p. iii, 1901.
Stegomyia Theobald, Journ. Trop. Med., iv, 235, 1901 (without species).
Culex (in part) Theobald, Journ. Trop. Med., iv, 235, 1901 (without species).
Aëdes Theobald, Journ. Trop. Med., iv, 235, 1901 (without species).
Stegomyia Theobald, Mon. Culic., i, 98, 283, 1901.
Culex (in part) Theobald, Mon. Culic., i, 98, 326, 1901.
Aëdes (in part) Theobald, Mon. Culic., i, 98, ii, 224, 1901.
Stegomyia Howard, Mosquitoes, 155, 1901.
Culex (in part), ***Stegomyia*** and ***Aëdes*** Coquillett in Howard's Mosquitoes, 235, 1901.
Stegomyia Theobald, Proc. Royal Soc. London, lxix, 382, 1902.

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Culex (in part), *Stegomyia* and *Aëdes* Neveu-Lemaire, C. R. Soc. Biol. Paris, liv, 1331, 1902.
Culex (in part) Neveu-Lemaire, Mém. Soc. Zool. Fr., xv, 209, 1902.
Stegomyia Neveu-Lemaire, Mém. Soc. Zool. Fr., xv, 211, 1902.
Aëdes Neveu-Lemaire, Mém. Soc. Zool. Fr., xv, 220, 1902.
Stegomyia Neveu-Lemaire, Archiv. de Parasitol., vi, 15, 1902.
Stegomyia Dyé, Archiv. de Parasit., vi, 366, 1902.
Culex (in part) Giles, Gnats or Mosq., 2 ed., 335, 386, 1902.
Taeniorhynchus (in part) Giles, Gnats or Mosq., 2 ed., 335, 358, 1902.
Ædes (in part) Giles, Gnats or Mosq., 2 ed., 475, 480, 1902.
Stegomyia Giles, Gnats or Mosq., 2 ed., 335, 368, 1902.
Aëdes (in part) Johannsen, N. Y. State Mus., Bull. 68, 390, 392, 424, 1903.
Culex (in part) Johannsen, N. Y. State Mus., Bull. 68, 390, 391, 392, 411, 1903.
Stegomyia Johannsen, N. Y. State Mus., Bull. 68, 390, 1903.
Stegomyia Theobald, Journ. Trop. Med., vi, 237, 1903.
Stegomyia Theobald, Mon. Culic., iii, 139, 1903.
Culex (in part) Theobald, Mon. Culic., iii, 157, 1903.
Gilesia Theobald, Mon. Culic., iii, 233, 1903.
Grabhamia (in part) Theobald, Mon. Culic., iii, 243, 1903.
Acartomyia Theobald, Mon. Culic., iii, 251, 1903.
Taeniorhynchus (in part) Theobald, Mon. Culic., iii, 257, 1903.
Finlaya Theobald, Mon. Culic., iii, 281, 1903.
Aedimorphus Theobald, Mon. Culic., iii, 290, 1903.
Aëdes Theobald, Mon. Culic., iii, 285, 1903.
Howardina Theobald, Mon. Culic., iii, 287, 1903.
Skusea Theobald, Mon. Culic., iii, 291, 1903.
Verrallina Theobald, Mon. Culic., iii, 295, 1903.
Macleaya Theobald, the Entom., xxxvi, 154, 1903.
Catageiomyia Theobald, Thomps. Yates & Johnst. Lab. Repts., v, pt. 2, p. i, 1903.
Stegomyia, *Culex* (in part) Coquillett, Rev. de Med. Trop., iv, 113, 1903.
Culex (in part), Felt, Bull. 79, N. Y. State Mus., 271, 277, 1904.
Culiciesa Felt, Bull. 79, N. Y. State Mus., 391*b*, 1904.
Ecculex Felt, Bull. 79, N. Y. State Mus., 391*c*, 1904.
Protoculex Felt, Bull. 79, N. Y. State Mus., 391*d*, 1904.
Aëdes Felt, Bull. 79, N. Y. State Mus., 391*e*, 1904.
Culicada Felt, Bull. 79, N. Y. State Mus., 391*b*, 1904.
Hulecoeteomyia Theobald, Entom., xxxvii, 163, 1904.
Taeniorhynchus (in part) Lutz in Bourroul, Mosq. do Brasil, 60, 1904.
Stegomyia and *Culex* (in part) Lutz in Bourroul, Mosq. do Brasil, 60, 61, 1904.
Danielsia Theobald, Entomologist, xxxvii, 78, 1904.
Scutomyia Theobald, Entomologist, xxxvii, 77, 1904.
Taeniorhynchus (in part) Giles, Journ. Trop. Med., vii, 381, 1904.
Stegomyia Dyar, Proc. Ent. Soc. Wash., vii, 45, 46, 1905.
Ecculex Dyar, Proc. Ent. Soc. Wash., vii, 45, 47, 1905.
Culiciesa Dyar, Proc. Ent. Soc. Wash., vii, 45, 48, 1905.
Grabhamia Dyar, Proc. Ent. Soc. Wash., vii, 45, 48, 1905.
Protoculex Dyar, Proc. Ent. Soc. Wash., vii, 45, 48, 1905.
Aëdes Dyar, Proc. Ent. Soc. Wash., vii, 45, 49, 1905.
Pseudoculex Dyar, Proc. Ent. Soc. Wash., vii, 45, 47, 1905.
Gualteria Lutz, Imprensa Medica, 1905, 65, 1905.
Culex (in part) Blanchard, Les Moustiques, 153, 267, 1905.
Aëdes (in part) Blanchard, Les Moustiques, 153, 399, 1905.
Stegomyia Blanchard, Les Moustiques, 152, 247, 1905.
Gilesia Blanchard, Les Moustiques, 394, 1905.
Macleaya Blanchard, Les Moustiques, 626, 1905.
Catagiomyia Blanchard, Les Moustiques, 627, 1905.
Finlaya Blanchard, Les Moustiques, 415, 630, 1905.
Howardina (in part) Blanchard, Les Moustiques, 399, 415, 1905.
Taeniorhynchus (in part) Blanchard, Les Moustiques, 153, 381, 1905.
Stegomyia Theobald, Gen. Ins., Dipt., 26 fasc., 14, 18, 1905.
Scutomyia Theobald, Gen. Ins., Dipt., 26 fasc., 14, 19, 1905.
Hulecoetomyia Theobald, Gen. Ins., Dipt., 26 fasc., 15, 20, 1905.
Skusea Theobald, Gen. Ins., Dipt., 26 fasc., 14, 19, 1905.
Aedimorphus Theobald, Gen. Ins., Dipt., 26 fasc., 14, 19, 1905.
Phagomyia Theobald, Gen. Ins., Dipt., 26 fasc., 15, 21, 1905.
Polyleptiomyia Theobald, Gen. Ins., Dipt., 26 fasc., 15, 21, 1905.
Howardina Theobald, Gen. Ins., Dipt., 26 fasc., 15, 21, 1905.
Lepidotomyia Theobald, Gen. Ins., Dipt., 26 fasc., 15, 22, 1905.

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Danielsia Theobald, Gen. Ins., Dipt., 26 fasc., 15, 21, 1905.
Grabhamia (in part) Theobald, Gen. Ins., Dipt., 26 fasc., 15, 23, 1905.
Acartomyia Theobald, Gen. Ins., Dipt., 26 fasc., 15, 24, 1905.
Taeniorhynchus (in part) Theobald, Gen. Ins., Dipt., 26 fasc., 15, 30, 1905.
Culex (in part) Theobald, Gen. Ins., Dipt., 26 fasc., 15, 24, 1905.
Finlaya Theobald, Gen. Ins., Dipt., 26 fasc., 15, 32, 1905.
Macleaya Theobald, Gen. Ins., Dipt., 26 fasc., 15, 20, 1905.
Gilesia Theobald, Gen. Ins., Dipt., 26 fasc., 15, 22, 1905.
Aëdes Theobald, Gen. Ins., Dipt., 26 fasc., 34, 35, 1905.
Reedomyia Ludlow, Can. Ent., xxxvii, 94, 1905.
Pecomyia Theobald, Journ. Econom. Biol., i, 23, 1905.
Culicida Theobald, Journ. Econ. Biol., i, 26, 1905.
Pseudograbhamia Theobald, Journ. Bombay Nat. Hist. Soc., xvi, 243, 1905.
Chrysoconops Goeldi, Os Mosq. no Pará, 114, 1905.
Lepidotomyia Theobald, Ann. Mus. Nat. Hungar., iii, 80, 1905.
Stegomyia Theobald, Mosq. or Culic. Jamaica, 7, 1905.
Howardina Theobald, Mosq. or Culic. Jamaica, 7, 1905.
Culex (in part) Theobald, Mosq. or Culic. Jamaica, 7, 1905.
Grabhamia (in part) Theobald, Mosq. or Culic. Jamaica, 7, 1905.
Gymnometopa Coquillett, Proc. Ent. Soc. Wash., vii, 183, 1906.
Ochlerotatus Coquillett, Science, n. s., xxiii, 314, 1906.
Lepidoplatys Coquillett, Science, n. s., xxiii, 314, 1906.
Lepidoplatys Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. ser. 11, 15, 18, 1906.
Aëdes Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. ser. 11, 15, 18, 1906.
Ochlerotatus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. ser. 11, 15, 18, 1906.
Gymnometopa Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. ser. 11, 16, 25, 1906.
Howardina Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. ser. 11, 16, 26, 1906.
Stegomyia Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. ser. no. 11, 15, 17, 1906.
Verrallina Coquillett (not Theobald), U. S. Dept. Agr., Bur. Ent., Tech. ser. 11, 15, 17, 1906.
Aëdes (in part) Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 188, 1906.
Quasistegomyia Theobald, 2d Rept. Wellcome Res. Lab., 69, 1906.
Duttonia Newstead, Ann. Trop. Med. & Paras., i, 17, 1907.
Aëdes, Culex (in part) and *Stegomyia* Howard, Osler's Modern Medicine, i, 372, 1907.
Stegomyia Autran, Anal. Dep. Nac. Hig., xiv, 17, 1907.
Culex (in part) Autran, Anal. Dep. Nac. Hig., xiv, 19, 1907.
Quasistegomyia Theobald, Mon. Culic., iv, 148, 165, 1907.
Stegomyia Theobald, Mon. Culic., iv, 148, 170, 1907.
Scutomyia Theobald, Mon. Culic., iv, 148, 196, 1907.
Aedimorphus Theobald, Mon. Culic., iv, 148, 199, 1907.
Gymnometopa Theobald, Mon. Culic., iv, 209, 1907.
Howardina Theobald, Mon. Culic., iv, 149, 214, 1907.
Hulecoeteomyia Theobald, Mon. Culic., iv, 149, 219, 1907.
Pseudoskusea Theobald, Mon. Culic., iv, 148, 192, 1907.
Pseudohowardina Theobald, Mon. Culic., iv, 149, 223, 1907.
Neomacleaya Theobald, Mon. Culic., iv, 149, 238, 1907.
Phagomyia Theobald, Mon. Culic., iv, 149, 223, 1907.
Polylepiomyia Theobald, Mon. Culic., iv, 149, 223, 1907.
Danielsia Theobald, Mon. Culic., iv, 149, 240, 1907.
Lepidotomyia Theobald, Mon. Culic., iv, 149, 249, 1907.
Protomacleaya Theobald, Mon. Culic., iv, 149, 253, 1907.
Reedomyia Theobald, Mon. Culic., iv, 149, 257, 1907.
Pecomyia Theobald, Mon. Culic., iv, 149, 265, 1907.
Grabhamia (in part) Theobald, Mon. Culic., iv, 150, 284, 1907.
Pseudograbhamia Theobald, Mon. Culic., iv, 150, 314, 1907.
Acartomyia Theobald, Mon. Culic., iv, 150, 1907.
Culicada Theobald, Mon. Culic., iv, 151, 318, 1907.
Culicelsa Theobald, Mon. Culic., iv, 151, 377, 1907.
Culex (in part) Theobald, Mon. Culic., iv, 151, 387, 1907.
Ecculex Theobald, Mon. Culic., iv, 460, 1907.
Protoculex Theobald, Mon. Culic., iv, 151, 463, 1907.
Banksinella Theobald, Mon. Culic., iv, 468, 1907.
Chrysoconops (in part) Theobald, Mon. Culic., iv, 151, 491, 1907.
Lepidoplatys Theobald, Mon. Culic., iv, 151, 501, 1907.
Aëdes (in part) Theobald, Mon. Culic., iv, 537, 1907.
Gualteria Theobald, Mon. Culic., iv, 552, 1907.
Catageiomyia Theobald, Mon. Culic., iv, 149, 1907.
Macleaya Theobald, Mon. Culic., iv, 148, 203, 1907.

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Gilesia Theobald, Mon. Culic., iv, 150, 1907.
Phagomyia Theobald, Mon. Culic., iv, 149, 223, 1907.
Polyleptiomyia Theobald, Mon. Culic., iv, 149, 223, 1907.
Finlaya Theobald, Mon. Culic., iv, 152, 521, 1907.
Skusea Theobald, Mon. Culic., iv, 542, 1907.
Stegomyia Dyar & Knab, Can. Ent., xxxix, 48, 1907.
Aëdes (in part) Dyar & Knab, Can. Ent., xxxix, 48, 1907.
Mimeteculex Theobald, 3d Rept. Wellcome Res. Lab., 258, 1908.
Stegomyia Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 65, 81, 1908.
Macleaya Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 66, 1908.
Phagomyia Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 66, 1908.
Catageiomyia Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 66, 1908.
Polyleptiomyia Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 66, 1908.
Scutomyia Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 66, 105, 1908.
Hulecoeteomyia Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 66, 107, 1908.
Howardina Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 67, 1908.
Acartomyia Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 67, 1908.
Skusea Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 67, 117, 1908.
Danielsia Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 67, 117, 1908.
Lepidotomyia Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 67, 132, 1908.
Grabhamia Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 68, 1908.
Finlaya Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 68, 1908.
Gilesia Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 68, 1908.
Geitomyia Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 134, 1908.
Aioretomyia Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 185, 1908.
Verrallina Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 180, 196, 1908.
Stegomyia Williston, Manual N. A. Dipt., 3 ed., 108, 1908.
Aëdes (in part) Williston, Manual N. A. Dipt., 3 ed., 108, 1908.
Stegomyia Peryassú, Os Culic. do Bras., 34, 165, 1908.
Stegoconops (in part) Peryassú, Culic. Bras., 34, 169, 1908.
Danielsia Peryassú, Culic. Bras., 35, 174, 1908.
Gualteria Peryassú, Culic. Bras., 35, 177, 1908.
Culicelsa Peryassú, Culic. Bras., 35, 185, 1908.
Culex (in part) Peryassú, Culic. Bras., 35, 187, 1908.
Protoculex Peryassú, Culic. Bras., 35, 215, 1908.
Chrysoconops Peryassú, Culic. Bras., 35, 230, 1908.
Stegomyia Theobald, Mon. Culic., v, 112, 151, 1910.
Scutomyia Theobald, Mon. Culic., v, 113, 199, 1910.
Howardina Theobald, Mon. Culic., v, 114, 220, 1910.
Danielsia Theobald, Mon. Culic., v, 114, 243, 1910.
Lepidotomyia Theobald, Mon. Culic., v, 114, 249, 1910.
Protomacleaya Theobald, Mon. Culic., v, 115, 250, 1910.
Reedomyia Theobald, Mon. Culic., v, 115, 252, 1910.
Pecomyia Theobald, Mon. Culic., v, 115, 260, 1910.
Grabhamia (in part) Theobald, Mon. Culic., v, 116, 277, 1910.
Pseudograbhamia Theobald, Mon. Culic., v, 116, 292, 1910.
Acartomyia Theobald, Mon. Culic., v, 116, 292, 1910.
Culicada Theobald, Mon. Culic., v, 116, 294, 1910.
Culicelsa Theobald, Mon. Culic., v, 116, 315, 1910.
Culex (in part) Theobald, Mon. Culic., v, 116, 322, 1910.
Protoculex Theobald, Mon. Culic., v, 116, 401, 1910.
Banksinella Theobald, Mon. Culic., v, 117, 402, 1910.
Chrysoconops (in part) Theobald, Mon. Culic., v, 117, 433, 1910.
Lepidoplatys Theobald, Mon. Culic., v, 117, 453, 1910.
Gymnometopa Theobald, Mon. Culic., v, 218, 1910.
Mycosquamus Theobald, Mon. Culic., v, 114, 225, 1910.
Neopecomyia Theobald, Mon. Culic., v, 115, 261, 1910.
Stenoscutus Theobald, Mon. Culic., v, 115, 263, 1910.
Taeniorhynchus (in part) Theobald, Mon. Culic., v, 117, 418, 1910.
Aëdes (in part) Theobald, Mon. Culic., v, 432, 1910.
Hulecoeteomyia Theobald, Mon. Culic., v, 114, 222, 1910.
Kingia Theobald, Mon. Culic., v, 112, 135, 1910.
Macleaya Theobald, Mon. Culic., v, 113, 218, 1910.
Quasistegomyia Theobald, Mon. Culic., v, 112, 132, 1910.
Aedimorphus Theobald, Mon. Culic., v, 113, 203, 1910.
Phagomyia Theobald, Mon. Culic., v, 114, 224, 1910.
Polyleptiomyia Theobald, Mon. Culic., v, 114, 227, 1910.

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Neomacleaya Theobald, Mon. Culic., v, 114, 243, 1910.
Catageiomyia Theobald, Mon. Culic., v, 115, 1910.
Bathosomyia Theobald, Mon. Culic., v, 115, 267, 1910.
Gilesia Theobald, Mon. Culic., v, 115, 269, 1910.
Mimeteculex Theobald, Mon. Culic., v, 117, 403, 1910.
Finlaya Theobald, Mon. Culic., v, 118, 464, 1910.
Molpemyia Theobald, Mon. Culic., v, 118, 479, 1910.
Skusea Theobald, Mon. Culic., v, 488, 1910.
Verrallina Theobald, Mon. Culic., v, 494, 1910.
Leslieomyia Christophers, Paludism, No. 2, 68, 1911.
Banksinella Edwards, Bull. Ent. Res., ii, 242, 243, 245, 1911.
Ochlerotatus Edwards, Bull. Ent. Res., ii, 242, 243, 246, 1911.
Andersonia Strickland, The Entom., xliv, 250, 1911.
Banksinella Edwards, Bull. Ent. Res., iii, 4, 6, 1912.
Stegomyia Edwards, Bull. Ent. Res., iii, 4, 7, 1912.
Ochlerotatus Edwards, Bull. Ent. Res., iii, 4, 14, 1912.
Howardina Edwards, Bull. Ent. Res., iii, 5, 12, 1912.
Aëdes Edwards, The Entom., xlv, 192, 193, 260, 1912.
Ochlerotatus Edwards, The Entom., xlv, 193, 194, 1912.
Aëdes Edwards, Bull. Ent. Res., iv, 229, 1913.

The type species are for:

Acartomyia Theobald, *Acartomyia zammitti* Theobald;
Aëdes Meigen, *Aëdes cinereus* Meigen;
Aëdimorphus Theobald, *Uranotænia domestica* Theobald;
Aioretomyia Leicester, *Aioretomyia varietas* Leicester;
Andersonia Strickland, *Andersonia tasmaniensis* Strickland;
Banksinella Theobald, *Culex luteolateralis* Theobald;
Bathosomyia Theobald, *Bathosomyia abnormalis* Theobald;
Catageiomyia Theobald, *Catageiomyia senegalensis* Theobald;
Chrysoconops Goeldi, *Culex fulvus* Wiedemann;
Culicada Felt, *Culex canadensis* Theobald;
Culicelsa Felt, *Culex tæniorhynchus* Wiedemann;
Danielsia Theobald, *Danielsia albotæniata* Theobald;
Duttonia Newstead, *Duttonia tarsalis* Newstead;
Ecculex Felt, *Culex sylvestris* Theobald;
Finlaya Theobald, *Finlaya poicilia* Theobald;
Geitomyia Leicester, *Culex cæcus* Theobald;
Gilesia Theobald, *Gilesia aculeata* Theobald;
Gualteria Lutz, *Gualteria oswaldi* Lutz;
Gymnometopa Coquillett, *Stegomyia mediovittata* Coquillett;
Heteronycha Arribálzaga, *Heteronycha dolosa* Arribálzaga;
Howardina Theobald, *Culex* (*Stegomyia ?*) *walkeri* Theobald;
Hulecæteomyia Theobald, *Hulecæteomyia trilineata* Theobald;
Kingia Theobald, *Stegomyia luteocephala* Newstead;
Lepidoplatys Coquillett, *Culex squamiger* Coquillett;
Lepidotomyia Theobald (Genera Insectorum), *Lepidotomyia magna* Theobald;
Lepidotomyia Theobald (Ann. Mus. Nat. Hung.), *Lepidotomyia alboscutellata* Theobald;
Leslieomyia Christophers, *Leslieomyia tæniorhynchoides* Christophers;
Macleaya Theobald, *Macleaya tremula* Theobald;
Mimeteculex Theobald, *Mimeteculex kingii* Theobald;
Molpemyia Theobald, *Molpemyia purpurea* Theobald;
Myxosquamus Theobald, *Myxosquamus confusus* Theobald;
Neomacleaya Theobald, *Neomacleaya indica* Theobald;
Neopecomyia Theobald, *Neopecomyia uniannulata* Theobald;
Ochlerotatus Arribálzaga, *Ochlerotatus confirmatus* Arribálzaga;
Pecomyia Theobald, *Pecomyia maculata* Theobald;
Phagomyia Theobald, *Stegomyia gubernatoris* Giles;
Polylepiomyia Theobald, *Stegomyia albocephala* Theobald;
Protoculex Felt, *Culex serratus* Theobald;
Protomacleaya Theobald, *Culex triseriatus* Say;
Pseudoculex Dyar, *Culex aurifer* Coquillett;
Pseudograbhamia Theobald, *Pseudograbhamia maculata* Theobald;
Pseudohowardina Theobald, *Culex trivittatus* Coquillett;
Pseudoskusea Theobald, *Skusea multiplex* Theobald;
Quasistegomyia Theobald, *Quasistegomyia unilineata* Theobald;

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Reedomyia Ludlow, ***Reedomyia pampangensis*** Ludlow;
Scutomyia Theobald, ***Scutomyia albolineata*** Theobald;
Skusea Theobald, ***Aëdes pembaënsis*** Theobald;
Stegomyia Theobald, ***Culex fasciatus*** Fabricius;
Stenoscutus Theobald, ***Stenoscutus africanus*** Theobald;
Tæniorhynchus Arribálzaga, ***Culex tæniorhynchus*** Wiedemann;
Verrallina Theobald, ***Aëdes butleri*** Theobald.

GENERIC DIAGNOSIS OF ADULT:

Proboscis moderate, uniform, variable in length and thickness. Palpi short in the female; in the male usually long, occasionally short. Antennæ filiform in the female, the joints subequal, the basal whorls of moderate hairs; plumose in the male, the last two joints long, the others short, thickened at the insertions of the hair whorls. Clypeus usually nude, rarely with scales. Prothoracic lobes well separated. Mesonotum with rows of setæ on the disk. Scutellum trilobate. Postnotum nude. Abdomen tapering to the tip in the female, the cerci prominent, the eighth segment partly membranous and retractile; elongate in the male, depressed, usually with abundant lateral ciliation. Harpagones of the male genitalia with a slender base, bearing a terminal filament, rarely absent. Hind legs with a row of spines on the tibial scraper. The claws of the female are most often toothed, in some species simple; those of the male are unequal and toothed at least in part.

GENERIC DIAGNOSIS OF LARVA:

Head rounded, depressed, the antennæ usually small, with a short hair or hair-tuft situated near the middle and short terminal spines. Lateral comb of the eighth segment of many or few scales, sometimes in a single row. Air tube of various lengths, usually short and stout, with basal pecten and a single pair of ventral hairs or hair tufts; in one species with several dorsal hair tufts. Anal segment with dorsal plate or ringed; ventral brush well developed. Anal gills four, subequal, variously developed in the species.

Distributed throughout the world. The mosquitoes which are said to be so numerous in the Arctic regions belong here, as well as many tropical forms.

The genus ***Aëdes*** was originally proposed for a single European species which has short palpi in the male sex. All the related species having long palpi in this sex were placed in the genus ***Culex***. This distinction was retained until the year 1906 when the genus was recast on larval characters by Dyar and Knab. To ***Aëdes*** as originally formulated were subsequently added other species having short palpi in the male, some belonging to the Sabethini, others to the genera ***Uranotænia*** and ***Aëdeomyia***, and some to the genus ***Culex*** proper. The genus attained to no large size until it was discovered that the short palpi of the male occurred independently in several groups and that they could not properly be used for generic definition. On referring to more fundamental characters it became apparent that the name ***Aëdes*** applied to a large group of species which are distinguished from ***Culex*** in both the adult and larval stages. ***Aëdes*** is the earliest generic name applied to any species of this group, although the type species is really atypical in having short palpi in the male. Of the 84 American species treated here only one has this structure. In 1891 Lynch Arribálzaga applied four generic names to members of this group and later, between 1901 and 1910, many other names were proposed for various sections of the genus, which we think are unimportant and furthermore cannot be defined with sufficient exactness to be recognized.

The following generic names are here referred to the synonymy in accordance with the revisional work on old world Culicidae by F. W. Edwards (Bull. Ent. Research, iii, 6, 7, 14, 1912; iv, 229, 1913): ***Finlaya, Aedimorphus, Phagomyia, Polyleptiomyia, Skusea, Verrallina, Duttonia, Mimeteculex, Geitomyia, Aioretomyia, Kingia, Bathosomyia, Leslieomyia, Macleaya, Gilesia, Molpemyia*** and ***Andersonia***. We have examined the male genitalia of a ***Finlaya*** from Samoa and find that they show all the characteristic parts of typical ***Aëdes***.

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The genus includes several groups which are somewhat defined by their habits in the early stages, as will be described in the following, but they are not sufficiently differentiated to be susceptible of generic separation. Even *Stegomyia*, proposed for *Culex fasciatus* Fabricius, can not be recognized as a genus or subgenus. The scaling of the clypeus is not of generic value, while the larvæ are typical *Aëdes*. A number of species grouping around this species depart from the typical *Aëdes* in that some of the posterior segments of the female abdomen are more or less expanded. All the forms with simple claws are so modified, but others retain the toothed claws and there appears to be no dependable line of demarcation between these forms and the typical *Aëdes*.

F. W. Edwards recognizes five genera, *Banksinella, Stegomyia, Ochlerotatus, Howardina* and *Aëdes*, for the group here indicated under the last name. He discusses *Ochlerotatus, Stegomyia* and *Aëdes* as follows: "*Ochlerotatus* differs from *Aëdes* in having the male palpi elongate, about equal in length to the proboscis; and from *Stegomyia* in having the last two joints of the ♂ palpi more or less swollen, and with distinct hair tufts; the penultimate joint is a little longer and distinctly thicker than the terminal. There is apparently no structural character by which the females of *Aëdes, Ochlerotatus*, and *Stegomyia* can be distinguished, and this lends support to the view held by Dyar and Knab, that the three genera should all be merged into *Aëdes*. The difference in the males, however, is so striking, that it is difficult to see how they can all be regarded as belonging to one genus. The three genera are here treated as distinct, though it is recognised that they are much more closely related among themselves than any of them are to the *Culex* and *Tæniorhynchus* [=*Mansonia*] group" (Bull. Ent. Res., iii, 15, 1912). Discussing *Stegomyia* on a previous page, this author says: "If the genus as now defined is dismembered, it may be found necessary to restrict it to the type species, *S. fasciata*, which has a very peculiar character in the scaly clypeus. However, the line taken by Dyar and Knab, of sinking both *Stegomyia* and *Ochlerotatus* under *Aëdes* would be wiser, probably, than further subdivision" (l. c., p. 8). In a more recent paper Edwards refers two other genera, *Armigeres* Theobald (=*Desvoidya* Blanchard) and *Leicesteria* Theobald, to the *Aëdes* group (Bull. Ent. Res., iv, 256, 1914). "The two genera together form a distinct division of the *Aëdes* group, distinguished by the peculiar structure of the male genitalia and (probably) by the structure of the larvæ, those of *Armigeres* having neither hair-tuft nor pecten on the siphon-tube." These two genera are confined to the Oriental region and have not been studied by us; they appear to be sufficiently distinct to be given generic rank. We include all but the two genera last mentioned under *Aëdes*. The females of the forms so included offer no characters for generic division, nor do we find a sufficient coördination of larval and male genitalic characters for the demarcation of groups. Edwards relies upon the differences in the male palpi to define his groups, but, aside from practical consideration (the males being often unavailable to the student and in some cases unknown), we think that some forms are intergradient in their palpal structure. We have felt obliged to include under *Aëdes* certain forms with simple claws in the female. These are grouped under *Howardina* by Edwards. Their relationship with the toothed-clawed forms is intimate and obvious, but we do not consider that these forms are all so closely related to each other that their segregation is warranted.

Arribálzaga's genus *Heteronycha* has been referred to the synonymy of *Culex* by Coquillett, a procedure altogether in contradiction with the characters originally indicated. In Arribálzaga's generic table *Culex* is said to have simple claws in both sexes and *Heteronycha* is distinguished from it as follows: "Ungues maris infra denticulo acuto armati, antici et medii

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inaequales una sat magna alteraque distincté minore, feminae aequales longiusculi, infra denticulo acuto muniti" (Rev. Mus. de La Plata, i, 373, 1891). Later, discussing the two genera, he says of *Culex*: "It is essentially distinguished from *Heteronycha* by the different structure of the palpi of the females and by its small claws, unarmed and curved in both sexes, while they are longer, slender, less curved and with a sharp tooth beneath in *Heteronycha*" (l. c., ii, 158, 1891). Again, under *Culex flavipes*, we find the following statement: "Its appearance, above all that of the females, does not differ much from what obtains in the type of my genus *Heteronycha*, but a brief examination of the claws is sufficient to recognize not only its specific diversity but also that of its position, for they are very small, arcuate and unarmed in one or the other sex of the true *Culex*, while in *Heteronycha* they are unidentate in the males and in the females" (l. c., ii, 159, 1891). Arribálzaga laid great stress on the male structures and this has obscured the essential data, but it is evident that the one species treated by him under *Heteronycha, H. dolosa*, has toothed claws in the female and therefore belongs with *Aëdes*. Contrasting the habits of this insect with the form he calls *Culex flavipes*, he points out that *Heteronycha dolosa* is essentially a mosquito of the country, while the other is associated with man and abounds in the city of Buenos Aires and other towns. There is good reason to believe that the species Arribálzaga called *Culex flavipes* is the widely distributed form we treat under the name *Culex quinquefasciatus* (see volume iii, page 345).

The larvæ present some diversity in habits, although this is not so great as might be expected considering the considerable number of species in the genus. Some species inhabit temporary rain-puddles of a more or less evanescent character. These larvæ are less rapid in their development than those of *Psorophora*. They may occur in the same puddles with *Psorophora*, but they also inhabit many other situations. Some species inhabit salt water, the temporary pools left by high tides at the back of the beaches along the sea coasts; others inhabit the pools formed by the melting snows in northern latitudes, and these species have but a single annual generation, which appears in the larval stage very early in spring. These species have a northern range, and it is to this group that the arctic mosquitoes belong. Some, while appearing with the early spring broods, appear also later as a second issue, or irregularly in temporary rain-puddles. These latter do not extend to the extreme north, and it is to this group that the salt water forms belong; to the southward these intergrade with the following group, which is more numerous in the tropics. These are inhabitants of rain-pools and differ in habits from the northern forms only in that they are not restricted to a single early spring issuance; being inhabitants of southern or tropical localities they continue to breed throughout the year whenever water is supplied by the rains. The last group are inhabitants of hollow trees, in which water collects and stands for a long time. This water is of a dark color and peculiar composition. The species addicted to it have no other habitat in nature, though they take more or less readily to artificial receptacles made of wood or fouled by vegetable detritus. These species are few in northern localities, but much more numerous in the tropics. The adults are frequently gaily ornamented. *"Stegomyia" calopus* belongs to this group. A few species which breed in the water held by the leaves of certain Bromeliaceæ may be considered an offshoot from this last group and in accordance they show considerable specialization.

The eggs are laid singly in places where water is liable to collect. It is probable that the eggs are generally deposited in the absence of water, though the locality may be moist. Certainly in the case of the early spring species this must be the case, as the females fly until August, long after their breeding-pools have

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entirely disappeared. Eggs have been found attached to dead leaves upon the ground and in the case of the salt-marsh species in the unsubmerged earth. The eggs do not hatch until after they have remained dormant for a time and then do so very promptly when submerged. The tree-hole breeders lay the eggs on the sides of the cavity, above the water-margin. One species, which inhabits holes in rocks, lays the eggs singly and scattered during the summer, but in fall places them in a compact mass adhering to the rock wall, where they pass the winter and endure even the fury of the spring floods to which they are subjected. The length of larval life varies greatly with the species, the water temperature and food supply, but we do not know of any *Aëdes* that passes the winter in the larval state.

The adult females fly for a number of weeks and probably all subsist at least in part on blood. With the single exception of *Aëdes calopus* none of our species are associates of man and do not habitually enter houses. Perhaps the majority of them never do so, and they are only troublesome in the forests or fields, or indoors only if especially abundant. In the northern woods the early spring species live until the middle of the summer and they are the principal mosquitoes to be met with in the woods of the northern states. Along the coasts the salt-marsh species are often very abundant and a serious nuisance.

The mating habits have been insufficiently observed. The males form swarms, or swarm slightly. Only four American species have been specifically observed and will be found described in this work as follows: *Aëdes spencerii*, vol. 1, p. 130; *Aëdes fitchii*, vol. 1, p. 131; *Aëdes calopus*, vol. 1, p. 275; *Aëdes varipalpus*, vol. 4, p. 647.

Tables of the Species.

Adults, Structure and Coloration.

1. Claws of the female toothed, at least on front and middle legs..... 2
   Claws of the female simple..... 65
2. Thoracic integument yellow..... 3
   Thorax brown or gray, not markedly paler than the abdomen..... 6
3. Mesonotum yellow with two black spots; abdomen and legs yellow..... 4
   Mesonotum without black spots; legs black..... 5
4. Pleurae with a broad dark bar; hind legs shortly ciliate
   fulvus Wiedemann (p. 624)
   Pleurae with a small dark dot or none; hind legs not ciliate
   bimaculatus Coquillett (p. 622)
5. Large; some of the tarsal joints white-marked..... *knabi* Coquillett (p. 841)
   Smaller; tarsi all black..... *hortator* Dyar & Knab (p. 843)
6. Tarsal joints or some of them white-ringed..... 7
   Tarsal joints without white rings..... 32
7. Joints white-ringed at base and apex..... 8
   Joints white-ringed at base only..... 17
8. Pale rings irregular, some of the joints not ringed..... 9
   Pale rings regular on the joints, diminishing evenly, the last joint of the hind feet wholly white..... 11
9. First joint of mid tarsi white with very narrow black central ring
   podographicus Dyar & Knab (p. 812)
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10. Thorax of female with anterior silvery patch cut by a median dark band
    oswaldi Lutz (p. 815)
    Thorax of female with anterior silvery patch united before
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    Medium sized species; pleurae whitish-gray scaled..... 13
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    Inland species from California to Illinois..... *curriei* Coquillett (p. 634)
14. Mesonotum pale, with broad dark median stripe..... 15
    Mesonotum not so marked..... 16
15. Mesonotum laterally light golden yellow..... *atropalpus* Coquillett (p. 638)
    Mesonotum laterally silver-white scaled..... *epactius* Dyar & Knab (p. 642)
16. Mesonotum pale yellowish, with dark spots..... *varipalpus* Coquillett (p. 644)
    Mesonotum wholly reddish yellow..... *canadensis* Theobald (p. 647)

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17. Proboscis of the female white ringed..... 18
Proboscis of the female not white ringed..... 22
18. Abdomen dark with a dorsal longitudinal pale stripe..... 19
Abdomen dark without such a stripe..... 21
19. Abdomen with sides and dorsal stripe concolorous..... 20
Abdomen with white lateral spots, not concolorous with dorsal stripe
sollicitans Walker (p. 658)
20. Wing-scales wholly dark; last hind tarsal wholly white
mitchellæ Dyar (p. 665)
Wing-scales dark with pale ones intermixed; last hind tarsal black at apex
nigromaculis Ludlow (p. 655)
21. White rings of hind tarsi moderate, last joint wholly white
tæniorhynchus Wiedemann (p. 667)
Tarsal rings small, last joint black with narrow white ring. *niger* Giles (p. 672)
22. Abdomen yellowish scaled, unbanded..... *fletcheri* Coquillett (p. 675)
Abdomen yellowish with dark scales intermixed and ill-contrasted pale bands 23
Abdomen with distinct segmental white bands..... 24
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Lateral scales of mesonotum creamy white
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24. Tarsi black with white rings..... 25
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25. Wing-scales broad, black and white..... 26
Wing-scales narrow, mostly brown..... 27
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28. Mesonotum with silvery-white lines..... 29
Mesonotum without such lines; clypeus nude..... 30
29. Mesonotum without a median white line; clypeus scaled
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Mesonotum with a median white line; clypeus nude
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30. White rings of hind tarsi broad; hind claws of female toothed. (Distinguishable with certainty only as larvæ and by male genitalia)
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sansoni Dyar & Knab (p. 686)
stimulans Walker (p. 679)
abfitchii Felt (p. 688)
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White rings of hind tarsi narrow; hind claws of female often simple..... 31
31. Terminal segments of abdomen above with basal pale bands
sylvestris Theobald (p. 694)
Terminal segments of abdomen above largely white-scaled
cantator Coquillett (p. 700)
32. Mesonotum golden brown or with brown stripes on a yellowish or gray ground 33
Mesonotum with strongly contrasting pale or dark stripes or spots..... 47
33. Abdomen yellowish-brown with blackish lateral stripe, most distinct posteriorly ..... *testaceus* van der Wulp (p. 717)
Abdomen black with lateral white spots..... 35
Abdomen with white scales at bases and apices of segments and some centrally, the black scales often reduced to a pair of spots or absent. 34
Abdomen with concrete basal pale segmental bands..... 36
34. Wing with basal halves of costa and first vein white scaled
spencerii Theobald (p. 723)
Wing with costa and first vein black scaled nearly to base
idahoensis Theobald (p. 727)
35. Mesonotum wholly dark brown scaled..... *nubilus* Theobald (p. 721)
Mesonotum laterally yellow scaled..... *aurifer* Coquillett (p. 766)
36. Abdomen with the sides continuously whitish..... 37
Abdomen with the sides not continuously white..... 38
37. Mesonotum wholly reddish brown scaled..... *fuscus* Osten Sacken (p. 729)
Mesonotum laterally pale scaled..... *idahoensis* Theobald (p. 727)
38. Mesonotum with a distinct brown double median stripe..... 39
Mesonotum not so marked..... 42

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39. Thoracic stripes narrowly separated by a single line of pale scales, rarely obsolete 40
Thoracic stripes broadly separated by a double line of white scales *pullatus* Coquillett (p. 738)
40. Disk creamy white, stripes reddish brown..... *aldrichi* Dyar & Knab (p. 735)
Disk straw yellow, the stripes blackish-brown..... 41
41. Head with four black spots..... *dectious* Howard, Dyar & Knab (p. 737)
Head without distinct dark spots..... *lazarensis* Felt & Young (p. 733)
42. Mesonotum with a median brown stripe..... 43
Mesonotum without a distinct median stripe..... 46
43. Thoracic brown stripe broad, indented at the middle of the sides *trichurus* Dyar (p. 759)
Thoracic brown stripe narrower, straight..... 44
44. Mesonotum creamy yellow at the sides..... *æstivalis* Dyar (p. 741) / *hirsuteron* Theobald (p. 743)
Mesonotum reddish brown at the sides *centrotus* Howard, Dyar & Knab (p. 747)
Mesonotum golden at the sides..... 45
45. Abdominal bands very broad..... *provocans* Walker (p. 748)
Abdominal bands narrow or obsolete at middle..... *auroides* Felt (p. 749)
46. Mesonotum dark reddish brown..... *aberratus* Felt & Young (p. 752)
Mesonotum yellowish brown..... *impiger* Walker (p. 755)
Mesonotum creamy yellow..... *diantæus* Howard, Dyar & Knab (p. 758)
47. Mesonotum with two yellowish or silvery-white sublateral stripes..... 51
Mesonotum with a median light colored stripe or area..... 50
Mesonotum with lateral pale stripes..... 48
48. Lateral stripes of mesonotum silvery white..... *triseriatus* Say (p. 762)
Lateral stripes of mesonotum yellow..... 49
49. Median thoracic stripe very broad..... *aurifer* Coquillett (p. 766)
Median thoracic stripe very narrow..... *obturbator* Dyar & Knab (p. 778)
50. Thoracic median stripe or area silvery..... 53
Thoracic median stripe or area golden..... 62
51. These stripes narrow..... 52
These stripes as broad as their intervals..... *trivittatus* Coquillett (p. 773)
52. Sides of head with a brown spot; thoracic pale stripes uniform *angustivittatus* Dyar & Knab (p. 776)
Sides of head without brown spot; thoracic pale stripes widening posteriorly *cuneatus* Dyar & Knab (p. 770)
53. Thoracic silvery mark a broad band or patch..... 54
Thoracic silvery mark a narrow median stripe..... 58
54. Silvery band reaching back to scutellum..... *dupreei* Coquillett (p. 779)
Silvery band not reaching back to scutellum..... 55
55. Abdominal segments with basal bands above *condolescens* Dyar & Knab (p. 789)
Abdomen without basal white bands above..... 56
56. Hind tibiæ entirely black..... 57
Hind tibiæ with a pale longitudinal stripe below.. *scapularis* Rondani (p. 783)
57. Legs light bronzy brown; dorsum of abdomen metallic *infirmatus* Dyar & Knab (p. 781)
Legs black; dorsum of abdomen black..... *euplocamus* Dyar & Knab (p. 787)
58. Mid femora with a median white spot..... *leucomelas* Lutz (p. 810)
Mid femora without such a spot..... 59
59. Hind tibiæ dark below..... 60
Hind tibiæ light below..... 61
60. Mid tibiæ white below..... *pertinax* Grabham (p. 791)
Mid tibiæ dark below..... *atlanticus* Dyar & Knab (p. 799)
61. From South and Central America to Mexico..... *serratus* Theobald (p. 794)
From Gulf coast of North America..... *tormentor* Dyar & Knab (p. 797)
62. Mesonotum medianly golden; brown along lateral margins continuous, diffused, not indented..... *bracteatus* Coquillett (p. 802)
Mesonotum dorsally golden; the brown at the lateral margin indented or cut into rounded spots..... 63
63. Mesonotum with the lateral brown indented by the golden of the dorsal area. 64
Mesonotum with a brown rounded lateral spot anteriorly, inclosed by the golden of the dorsal area..... *balteatus* Dyar & Knab (p. 809)
64. Species from Jamaica; top of head broadly pale..... *tortilis* Theobald (p. 806)
Species from Bahamas; top of head more narrowly pale *plutocraticus* Dyar & Knab (p. 804)
65. Mesonotum with narrow longitudinal white or golden lines..... 66
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66. Two middle thoracic lines running back to scutellum..... 67
Two middle lines running back two-thirds, followed by a single line..... 68
One middle thoracic line running back to the scutellum
septemstriatus Dyar & Knab (p. 846)
67. Mesothoracic dorsal lines golden..... *quadrivittatus* Coquillett (p. 852)
Thoracic lines silvery..... *sexlineata* Theobald (p. 847)
68. Lateral thoracic stripe broad, silvery-white..... *walkeri* Theobald (p. 849)
Lateral thoracic stripe narrow or broken, silvery..... 69
Lateral thoracic stripe golden..... 70
69. Median posterior thoracic line narrow, silvery... *albonotata* Coquillett (p. 853)
Median posterior thoracic line broad, ending in a silver spot on scutellum
buscki Coquillett (p. 860)
70. Hind tarsi with white bands on first and second joints. *aurites* Theobald (p. 859)
Hind tarsi with white bands on first, second, and third joints
aureostriata Grabham (p. 855)

The following species are omitted as insufficiently described: *excrucians* Walker, *punctor* Kirby.

MALE GENITALIA.

1. Harpago present, with a filamentous seta..... 2
Harpago absent..... 19
2. Filamentous seta arising from a distinct, rod-shaped harpago..... 3
Filamentous seta arising from a conical basal lobe..... 18
3. Side-piece with an apical lobe..... 4
Side-piece without an apical lobe..... 15
4. Filament of harpago with a median sharp retrose spine..... 5
Filament of harpago without a sharp spine..... 7
5. Spine of harpago with several shorter spines within
cuneatus Dyar & Knab (p. 772)
Spine of harpago with small denticles within
tortilis Theobald (p. 808)
plutocraticus Dyar & Knab (p. 805)
Spine of harpago simple..... 6
6. Tip of side-piece with a dense tuft of hair..... *aurifer* Coquillett (p. 768)
Tip of side-piece clothed like the rest..... *scapularis* Rondani (p. 786)
cuplocamus Dyar & Knab (p. 788)
infirmatus Dyar & Knab (p. 782)
trivittatus Coquillett (p. 775)
7. Basal lobe of side-piece broadly conical, with a single stout spine..... 8
Basal lobe similar but without the spine..... 12
Basal lobe small, semi-detached, bearing two spines..... 14
8. Filament of harpago slender, subfiliform..... *serratus* Theobald (p. 796)
dupreei Coquillett (p. 780)
Filament of harpago small with a notch close to base
fitchii Felt & Young (p. 684)
Filament of harpago elliptical, spatulate or angularly expanded..... 9
9. Filament of harpago calla-lily shaped..... *pertinax* Grabham (p. 793)
Filament of harpago with a lateral pointed projection..... 10
Filament of harpago elliptical or spatulate..... 11
10. Apical lobe of side-piece large..... *fletcheri* Coquillett (p. 677)
Apical lobe of side-piece small..... *bimaculatus* Coquillett (p. 623)
11. Stem of harpago short and stout
quayleï Dyar & Knab (see *onondagensis*, p. 631)
atlanticus Dyar & Knab (p. 801)
æstivalis Dyar (p. 742)
Stem of harpago short and slender..... *spencerii* Theobald (p. 725)
idahoensis Theobald (p. 728)
grossbecki Dyar & Knab (p. 711)
curriei Coquillett (p. 637)
onondagensis Felt (p. 631)
squamiger Coquillett (p. 707)
aberratus Felt (p. 753)
hirsuteron Theobald (p. 745)
auroides Felt (p. 751)
Stem of harpago long and slender..... *stimulans* Walker (p. 681)
cantator Coquillett (p. 701)
lasarensis Felt & Young (p. 734)

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12. Basal lobe of side-piece conical, strongly protuberant *riparius* Dyar & Knab (p. 714)
Basal lobe of side-piece moderate or small 13
13. Filament of harpago short, bud-shaped with transverse ridges *trichurus* Dyar (p. 761)
Filament of harpago with angular lateral expansion { *abfitchii* Felt (p. 690) / *sansoni* Dyar & Knab (p. 687) }
Filament of harpago long, lanceolate. { *campestris* Dyar & Knab (p. 629) / *euedes* Howard, Dyar & Knab (p. 715) }
Filament of harpago slender filiform ..... *canadensis* Theobald (p. 650)
14. Stem of harpago broadly angled beyond middle, hirsute and with a seta; side-piece without hair-tuft ..... *impiger* Walker (p. 756)
Stem of harpago similar; side-piece with a large hair-tuft at origin of apical lobe ..... *diantæus* Howard, Dyar & Knab (p. 758)
Stem of harpago angled before middle, hirsute only. *pullatus* Coquillett (p. 739)
15. Filament of harpago with sharp retrose central spine { *tæniorhynchus* Wiedemann (p. 669) / *niger* Giles (p. 674) }
Filament of harpago without central spine 16
16. Filament of harpago rather broad 17
Filament of harpago narrow, filiform ... { *sollicitans* Walker (p. 660) / *mitchellæ* Dyar (p. 666) / *nigromaculis* Ludlow (p. 657) / *thorntoni* Dyar & Knab (p. 820) / *podographicus* Dyar & Knab (p. 814) / *oswaldi* Lutz (p. 818) }
17. A long stout spine at base of side-piece ..... *mediovittata* Coquillett (p. 823)
Without such a spine ..... { *atropalpus* Coquillett (p. 640) / *varipalpus* Coquillett (p. 646) / *triseriatus* Say (p. 764) / *epactius* Dyar & Knab (p. 643) / *fluviatilis* Lutz (p. 721) }
18. Basal lobe of side-piece small, narrow ..... { *aureostriata* Grabham (p. 858) / *fulvithorax* Lutz (p. 846) }
Basal lobe of side-piece broadly conical ..... { *albonotata* Coquillett (p. 855) / *walkeri* Theobald (p. 851) / *buscki* Coquillett (p. 861) }
19. Clasp-filament furcate at the tip and with a projection at base *fuscus* Osten Sacken (p. 731)
Clasp-filament furcate, the claw inserted subapically, no projection at base *sylvestris* Theobald (p. 696)
Clasp-filament simple, normal ..... *calopus* Meigen (p. 836)

The following are omitted as we possess no male specimens:

fulvus Wied.	*provocans* Walk.	*knabi* Coq.
vittata Theob.	*angustivittatus* D. & K.	*hortator* D. & K.
cuochrus How., D. & K.	*obturbator* D. & K.	*septemstriatus* D. &, K.
testaceus van der Wulp.	*condolescens* D. & K.	*sexlineata* Theob.
nubilus Theob.	*tormentor* D. & K.	*quadrivittatus* Coq.
aldrichi D. & K.	*bracteatus* Coq.	*aurites* Theob.
decticus How., D. & K.	*balteatus* D. & K.	*excrucians* Walk.
centrotus How., D. & K.	*leucomelas* Lutz.	*punctor* Kirby.

LARVÆ (AËDES AND HÆMAGOGUS).

1. Air-tube with the hair-tuft within the pecten 2
Air-tube with the tuft beyond the pecten 8
2. Anal segment ringed by the plate 3
Anal segment with the ring broken on the ventral line 6
3. Lateral comb of the eighth segment of few scales in a nearly single row 4
Lateral comb of the eighth segment of many scales in a triangular patch 5
4. Pecten of the air-tube reaching to three-fourths, well beyond the tuft *tormentor* Dyar & Knab (p. 798)
Pecten of the air-tube reaching over half, the tuft just before the last tooth *pertinax* Grabham (p. 793)
5. Pecten of the air-tube with detached teeth outwardly *bimaculatus* Coquillett (p. 623)
Pecten of the air-tube with teeth evenly spaced ..... *tortilis* Theobald (p. 808)

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6. Comb of scales in an irregular double row; tube with several dorsal tufts *trichurus* Dyar (p. 761)
   Comb of long scales in a straight row; pecten of tube running to apex *walkeri* Theobald (p. 851)
   Comb a patch of scales; tube with one pair of hair-tufts 7
7. Pecten of the air-tube with detached teeth; abdominal hairs normal { *epactius* Dyar & Knab (p. 643) / *atropalpus* Coquillett (p. 640)
   Pecten evenly spaced; short abdominal hairs stellate. *buscki* Coquillett (p. 861)
8. Pecten of the air-tube with detached teeth outwardly 9
   Pecten of the air-tube with evenly spaced teeth 16
9. Air-tube four times as long as wide; comb a patch of scales three rows deep .. 10
   Air-tube three times as long as wide or less 12
10. Lateral abdominal hairs double ..... *fletcheri* Coquillett (p. 678)
    Lateral abdominal hairs single 11
11. Both pairs of dorsal head-hairs multiple ..... *fuscus* Osten Sacken (p. 731)
    Both pairs double ..... *abfitchii* Felt (p. 690)
    Lower pair single ..... *sansoni* Dyar & Knab (p. 687)
12. Antennæ large, enlarged basally; tuft rather beyond the middle *aurifer* Coquillett (p. 768)
    Antennæ moderate only, tuft before the middle 13
13. Dorsal head-hairs simple; comb of only a few large scales *spencerii* Theobald (p. 725)
    Head-hairs double or multiple; comb-scales smaller and more numerous 14
14. Lateral abdominal hairs double on third to fifth segments *sylvestris* Theobald (p. 696)
    Lateral abdominal hairs single beyond second segment 15
15. Air-tube stout, pecten usually with two detached teeth, tuft before outer third; comb of few scales ..... *impiger* Walker (p. 757)
    Tube more slender, pecten usually with three detached teeth, tuft at outer fourth; comb a patch of many scales ..... *fuscus* Osten Sacken (p. 731)
16. Comb-scales few, in a single or irregularly single row 17
    Comb-scales more numerous to many in a patch 26
17. Anal segment ringed by the plate 18
    Anal segment not ringed, at least a small space along the ventral line 21
18. Anal processes moderate, normal 19
    Anal processes very long with a stout central trachea *dupreei* Coquillett (p. 780)
19. Anal segment with dorsal tufts and hairs 20
    Anal segment dorsally with two pairs of hairs only *abserratus* Felt & Young (p. 753)
20. Comb of about six scales ..... *atlanticus* Dyar & Knab (p. 801)
    Comb of ten or more scales ..... *serratus* Theobald (p. 796)
21. Air-tube over 4 × 1; comb of many scales in a long row *aureostriata* Grabham (p. 858)
    Air-tube 3 × 1 or less; comb of few scales 22
22. Air-tube pecten dense, strongly spiral ..... *mediovittata* Coquillett (p. 823)
    Air-tube pecten normal, nearly straight 23
23. Comb-scales smooth, sharply pointed 24
    Comb-scales smooth or nearly so, bluntly rounded 25
    Comb-scales sole-shaped ..... *calopus* Meigen (p. 836)
24. Comb-scales separate; body glabrous ..... *H. equinus* Theobald (p. 873)
    Comb-scales joined; body densely pilose ..... *H. capricornii* Lutz (p. 877)
25. Short abdominal hairs normal; anal plate smooth ..... *triseriatus* Say (p. 765)
    Short abdominal hairs stellate; anal plate spined behind *albonotata* Coquillett (p. 855)
26. Anal segment ringed by the plate 27
    Anal segment not ringed by the plate 35
27. Scales of comb thorn-shaped or with distinct central spine 28
    Scales of comb evenly fringed, without central spine 33
28. Comb-scales about 14, thorn-shaped, without fringe ..... *auroides* Felt (p. 751)
    Comb-scales more numerous, with distinct central spine and lateral spinules. 29
29. Lateral hairs on abdominal segments 3 to 5 double 30
    Lateral hairs on these segments single 31
30. Air-tube less than 2½ × 1; anal gills short, bud-like *sollicitans* Walker (p. 660)
    Air-tube over 3 × 1; anal gills normal ..... *mitchellæ* Dyar (p. 666)

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31. Skin of body finely pilose..... *cuneatus* Dyar & Knab (p. 772)
Skin of body nude..... 32
32. Pecten-teeth of air-tube short, with very broad base.. *tortilis* Theobald (p. 808)
Pecten-teeth long, their bases normal..... *infirmatus* Dyar & Knab (p. 783) / *trivittatus* Coquillett (p. 775)
33. Skin of body distinctly pilose..... 34
Skin of body smooth or minutely spiculate.. *euplocamus* Dyar & Knab (p. 789)
34. Anal segment short, the chitinous ring narrow; anal gills rudimentary, bud-like ..... *tæniorhynchus* Wiedemann (p. 670) / *niger* Giles (p. 675)
Anal segment at least as long as wide, the ring broad; anal gills normal
scapularis Rondani (p. 786) / *bracteatus* Coquillett (p. 803)
35. Air-tube long, 4 × 1; tracheæ narrow, angled..... *fitchii* Felt & Young (p. 684)
Air-tube 3 × 1 or less..... 36
36. Anal plate small, not covering over half the segment; anal gills large and sac-like, spotted ..... *varipalpus* Coquillett (p. 646)
Anal plate over half encircling the segment; gills moderate..... 37
37. Comb-scales tapered, a single median spine stouter or longer, differentiated from the rest..... 38
Comb-scales bluntly rounded, the median spine resembling the rest..... 45
Comb-scales bluntly rounded, without spinules..... 46
38. Both pairs of dorsal head-hairs multiple..... 39
Lower pair single or double (rarely three)..... 42
39. Anal gills very short, bud-like; lateral hairs double on sixth abdominal segment ..... *cantator* Coquillett (p. 701)
Anal gills well developed; lateral hairs of sixth abdominal segment single.. 40
40. Chitinous parts deep brown..... *pullatus* Coquillett (p. 739)
Chitinous parts yellow-brown..... 41
41. Anterior thoracic margin with a pair of long submedian hairs *canadensis* Theobald (p. 651)
Anterior thoracic margin without conspicuous submedian hairs *curriei* Coquillett (p. 637)
42. Lower pair of dorsal head-hairs double (or three)..... 43
Lower head-hairs single..... 44
43. Comb-scales with the lateral spines as long as the apical one *grossbecki* Dyar & Knab (p. 711)
Comb-scales with the lateral spines very short... *hirsuteron* Theobald (p. 745)
44. Both pairs of dorsal head-hairs single..... *aestivalis* Dyar (p. 742)
Upper head-hairs double..... *stimulans* Walker (p. 681)
45. Antennæ spinulated 47
Antennæ smooth, the spinules obsolete..... 50
46. Lower pair of head-hairs double; secondary abdominal hairs not stellate *H. albomaculatus* Theobald (p. 870)
Lower head-hairs in fours; secondary abdominal hairs stellate, long *H. splendens* Williston (p. 866)
47. Anal gills normal, moderate..... 48
Anal gills very short, bud-shaped..... 49
48. Both pairs of head-hairs single..... *lazarensis* Felt & Young (p. 734)
Head-hairs in twos or threes..... *fluviatilis* Lutz (p. 721)
49. Both pairs of head-hairs double..... *squamiger* Coquillett (p. 708)
Head-hairs single ..... *onondagensis* Felt (p. 631)
50. Pecten of very few sparse teeth; anal plate with long spines on hind margin *busckii* Coquillett (p. 861)
Pecten of many close-set teeth; anal plate without large spines..... 51
51. Pecten followed by a single hair..... *knabi* Coquillett (p. 842)
Pecten followed by a tuft..... 52
52. Pecten short, of close-crowded short teeth; body with coarse stellate tufts *fulvithorax* Lutz (p. 846)
Pecten normal; body without conspicuous stellate tufts..... 53
53. Both pairs of dorsal head-hairs single..... 54
Dorsal head-hairs double and triple..... *oswaldi* Lutz (p. 818)
54. Pecten of air-tube not reaching half-way, the tuft well beyond *thornioni* Dyar & Knab (p. 820)
Pecten reaching middle of tube, the tuft placed close to its end *podographicus* Dyar & Knab (p. 814)

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Of the following species of *Aëdes* we possess no larvæ:

fulvus Wied.
campestris D. & K.
nigromaculis Ludl.
vittata Theob.
riparius D. & K.
cuedes How., D. & K.
cuochrus How., D. & K.
testaceus van der Wulp.
nubilus Theob.
idahoensis Theob.
aldrichi D. & K.
decticus How., D. & K.
centrotus How., D. & K.
provocans Walk.
diantæus How., D. & K.
angustivittatus D. & K.
obturbator D. & K.
condolescens D. & K.
punctor Kirby.
plutocraticus D. & K.
balteatus D. & K.
leucomelas Lutz.
hortator D. & K.
septemstriatus D. & K.
sexlineata Theob.
quadrivittatus Coq.
aurites Theob.
excrucians Walk.

AËDES BIMACULATUS (Coquillett) Dyar & Knab.

Culex bimaculatus Coquillett, Proc. U. S. Nat. Mus., xxv, 84, 1902.
Culex bimaculatus Dyar, Journ. N. Y. Ent. Soc., xi, 27, 1903.
Culex bimaculatus Dyar, Proc. Ent. Soc. Wash., v, 147, pl. 2, fig. 14, 1903.
Aëdes bimaculatus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 191, 1906.
Ochlerotatus bimaculatus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 18, 1906.
Ochlerotatus bimaculatus Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 4, 1906.
Aëdes bimaculatus Thibault, Proc. Ent. Soc. Wash., xii, 22, 1910.

ORIGINAL DESCRIPTION OF CULEX BIMACULATUS:

Bright yellow, the apices of the palpi and of the proboscis, also the antennæ except the bases, dark brown, a large black spot above insertion of each wing, apices of femora black, tarsi changing into brown toward the apices; bristly hairs and scales of the head and body bright yellow, mesonotum highly polished; tarsal claws large, the front and middle ones toothed, the hind ones simple; wings hyaline, strongly tinged with yellow along the costa, lateral scales of the veins very small, interspersed with very elongate, narrow ones, petiole of first submarginal cell nearly as long as that cell, crossvein at apex of second basal cell nearly its own length from the one at apex of first basal cell; length, 5 mm. A female specimen collected June 16 by Mr. C. H. T. Townsend.

Habitat.—Brownsville, Texas.

Type.—Cat. No. 6259, U. S. N. M.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES BIMACULATUS:

Female.—Proboscis rather long, cylindrical, uniform, with the labellæ conically tapered, yellowish, vestiture of deep golden-yellow scales, extreme tip black; setæ minute, brown, those on the labellæ more prominently outstanding. Palpi rather slender, nearly one-third as long as the proboscis, dark golden-yellow scaled, tip blackish; setæ rather long, brown. Antennæ with the joints subequal, the distal ones longer and more slender than the basal ones, blackish, pilose, rugose, extreme bases of joints between hair-whorl and articulation whitish; second joint yellow at base; tori subspherical, with a cup-shaped apical hollow, dark yellow. Clypeus elliptical, with a rounded tip, dark yellow, nude. Eyes dark chocolate brown. Occiput narrow, convex, luteous, clothed with recumbent, narrow curved golden-yellow scales and many long, slender, upright, yellowish forked scales; broad flat pale-yellow ones on the cheeks and along eye-margin.

Prothoracic lobes rather large, prominent, remote dorsally, yellow, with many brown bristles. Mesonotum with yellow, highly polished integument; on the disc two broad pale ferruginous stripes, separated by a very narrow yellow line and extending from the anterior margin to near antescutellar space, at this point they abruptly terminate with rounded ends and contain a brown spot; above the bases of the wings, occupying nearly the posterior half of the subdorsal area, large subquadrate black spots with a brownish edge; vestiture of rather dense, curved, narrow golden scales and golden-brown bristles, scales on the black spots sparse, hair-like, curved, black. Scutellum trilobate, dull yellow, mid-lobe with a patch of narrow, curved, black scales, each lobe with about eight golden-brown

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bristles. Postnotum convex prominent, yellow-brown, nude. Pleuræ brownish-yellow, sometimes with a round black spot centrally toward the upper margin, with several patches of broad silvery-white scales and rows of yellow bristles; coxæ with patches of golden scales.

Abdomen subcylindrical, flattened, posterior segments tapered, the cerci exserted; yellowish-brown, dorsally clothed with flat, dull orange-yellow scales and very broad, subtriangular apical bands of dull black scales; venter with the membrane dull luteous, the scales wholly orange-ochraceous; setæ fine, golden, rather numerous ventrally; cerci with black tips.

Wings large but rather narrow, hyaline; petiole of second marginal cell much shorter than its cell, that of second posterior cell shorter than its cell; basal cross-vein rather less than its own length distant from anterior cross-vein; costal, subcostal and first veins yellow to apical fourth and with deep golden-yellow scales, beyond the scales merging into dull brown; the other veins wholly brownish and with dull brown scales; proximal portion of second vein yellowish and with yellowish scales; outstanding scales on outer half of wing lanceolate, broader and denser toward apex of wing; fringe dull brown. Halteres yellow, with white tips.

Legs long and rather slender; femora yellow, with small golden-yellow scales, extreme tips black scaled; tibiæ golden scaled, extreme bases and tips black, the coarse setæ black, on the hind tibiæ some of the scales, especially apically, are slightly erected; tarsi deep golden-yellow scaled, tips of joints bronzy-brown scaled; last three hind tarsal joints diffusedly bronzy-brown scaled. Claw formula, 1.1–1.1–0.0.

Length: Body about 5 mm.; wing 4.5 mm.

Male.—Palpi long, exceeding the proboscis by nearly the length of the last two joints, which are slender and very slightly enlarged; vestiture dark golden-yellow, long joint with narrow black rings at the median false articulation and apex; penultimate joint basally black and with a black tip; last joint almost wholly black; end of long joint and last two joints with many long golden and black hairs. Antennæ plumose; last two joints long and pilose, the others short, yellowish, narrowly ringed with brown at the insertions of the hair-whorls; hairs long, blackish with brown luster. Coloration similar to the female. Wings hardly narrower than in the female, the stems of the fork-cells longer and the vestiture less abundant. Abdomen elongate, depressed, dorsally with very narrow, black apical bands; lateral ciliation coarse, pale brown. Claw formula, 2.1–2.1–0.0.

Length: Body broken; wing 4 mm.

Genitalia (plate 24, fig. 170): Side-pieces about three times as long as wide, uniform, tips rounded; a small narrow, lappet-shaped subapical lobe; a similar but larger basal lobe with a large spine at its base; clasp filament long, slightly swollen mesially, with a long terminally inserted spine. Harpes elliptical with revolute margins, tips thickened and hooked. Harpagones with a slender columnar stem slightly curved, terminal filament large, triangular, a basal angle at one side, tip pointed. Unci forming a small basal cone. Basal appendages narrow, with five setæ, arising from a lobe of the penultimate segment.

Larva, Stage IV (plate 118, fig. 406).—Head rounded, narrowed before eyes, a notch at insertion of antennæ, front margin arcuate. Antennæ cylindrical, slender, slightly swollen towards base, smooth; tuft small, situated before middle; four irregular, short terminal spines and a digit on a long pedestal. Eyes large, transverse, pointed. Upper pair of dorsal head-hairs single, lower double, anteantennal tufts multiple. Mental plate triangular outwardly, teeth very long, a central one and fifteen on each side, basal ones a little larger, suddenly ending, followed by a small short tooth near base. Mandible quadrangular, broad, with

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slight spines near base; two filaments near tip; an outer row of cilia from a collar; twelve filaments on outer edge, running close to dentition; dentition of four teeth on a process, the first very long and sharp, curved, the fourth next longest; a filament before, others within, small double teeth at base; process below cleft-furcate toward basal side, with thin hair patches; basal angle broad; three separated hairs within; a row of hairs at base. Maxilla conically hemispherical, tip rather sharp, divided by a linear suture; inner half sparsely haired on margin with a row of tufts along edge; a tuft of long hairs at tip, with shorter plumose tipped ones within; outer half with a few long hairs next the palpus, the two filaments not very near the suture and subapical; palpus short, with five digits, of which two are very small. Thorax rounded, wider than long; hairs abundant, the single lateral hairs long. Abdomen moderate, anterior segments shorter; lateral hairs triple on first segment, double on second, single on third to sixth, longer posteriorly; secondary hairs in long substellate bunches on fifth to seventh segments. Tracheal tubes broad, band-shaped, flexuous, slightly widened in posterior end of thorax. Air-tube stout, tapered outwardly, two and a half times as long as broad; pecten reaching well beyond middle, a large hair-tuft at middle and well within pecten; single pecten-tooth a long spine with wide base, bearing three short branches. Lateral comb of eighth segment of rather few scales in a triangular patch; single scale elliptical, pointed at base, blunt without, fringed evenly with very long slender spinules. Anal segment longer than broad, ringed by the plate; dorsal tuft a hair and brush on each side; a double lateral hair; ventral brush well developed, confined to the barred area. Anal gills long, twice as long as the segment, slightly constricted at base and outer third, the terminal third tapered to a point.

Life history and habits unknown.

Southern United States and Mexico.

Brownsville, Texas, June 16 (C. H. T. Townsend); New Orleans, Louisiana, September 24, 1902 (G. E. Beyer); Belzona, Mississippi, August 4, 1904 (H. S. Barber); Natchez, Mississippi, June 9, 1910 (A. Fleming); Scott, Pulaski County, Arkansas, September 23, 1909 (J. K. Thibault, jr.); Baton Rouge, Louisiana, November, 1902 (H. A. Morgan); San Blas, Mexico, November, 1903 (A. Dugès).

Aëdes bimaculatus and *A. fulvus* are remarkable for the predominating bright yellow color of both integument and vestiture, as well as the highly polished and but sparsely scaled thorax ornamented with black pigment spots. In addition the form of the body is more slender and the legs longer than in most *Aëdes*, while the female palpi are slender and fully one-third the length of the rather long proboscis. Some of the specimens included by us under *Aëdes fulvus* have the scales on the hind legs raised in the manner of the larger species of *Psorophora*. We find no such raised scales in our material of *Aëdes bimaculatus*, but our specimens are few and not reared. It is possible that these raised scales are very dehiscent and would be found present in fresh specimens.

AËDES FULVUS (Wiedemann) Knab.

Culex fulvus Wiedemann, Aussereur. zweifl. Ins., i, 546, 1828.
Culex ochripes Macquart, Dipt. exot., Suppl. 4, part 1, 315, 1850.
Culex flavicosta Walker, Ins. Saund., 431, 1856.
Culex flavicosta Giles, Handb. Gnats or Mosq., 194, 265, 1900.
Culex fulvus Giles, Handb. Gnats or Mosq., 190, 210, 1900.
Culex ochripes Giles, Handb. Gnats or Mosq., 201, 334, 1900.
Taeniorhynchus fulvus Theobald, Mon. Culic., ii, 208, 1901.
Taeniorhynchus fulvus Giles, Handb. Gnats or Mosq., 2 ed., 361, 1902.
Culex ochripes Giles, Handb. Gnats or Mosq., 2 ed., 470, 1902.
Culex fulvus Giles, Handb. Gnats or Mosq., 2 ed., 394, 1902.
Taeniorhynchus fulvus Theobald, Mon. Culic., iii, 237, 1903.

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Tæniorhynchus fulvus Giles, Journ. Trop. Med., vii, 383, 1904.
Tæniorhynchus fulvus Lutz in Bourroul, Mosquitos do Brasil, 70, 1904.
Tæniorhynchus fulvus Goeldi, Os Mosquitos no Pará, 112, 1905.
Chrysoconops fulvus Goeldi, Os Mosquitos no Pará, 114, 1905.
Culex ochripes Blanchard, Les Moustiques, 275, 1905.
Tæniorhynchus fulvus Blanchard, Les Moustiques, 387, 1905.
Psorophora fulva Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 14, 1906.
Chrysoconops fulvus Theobald, Mon. Culic., iv, 493, 1907.
Chrysoconops fulvus Peryassú, Os Culicideos do Brazil, 49, 230, 1908.
Aëdes fulvus Knab, Ent. News, xx, 387, 1909.
Chrysoconops fulvus Theobald, Mon. Culic., v, 443, 1910.

ORIGINAL DESCRIPTION OF CULEX FULVUS:

Nigellus, fulvo hirtus, pedibus posticis fusco annulatis. Mit schwärzlichem, goldgelbbehaartem Körper und braunbandirten hintersten Beinen.—2½ Linien ♀.—Aus Brasilien.

Fühler bräunlich; Rüssel und Taster (welche letztere etwas länger als gewöhnlich sind) goldgelb mit schwarzbrauner Spitze. Grundfarbe des Körpers glänzend bräunlichschwarz, mit goldgelben Härchen dicht besetzt, die am Hinterleibe etwas bleicher sind, und an den Einschnitten etwas Schwarzes durchscheinen lassen. Flügel an der Rippe goldgelb, mit schwarzbrauner Spitze. Beine goldgelb, an den vordersten die äussersten Spitzen der Schenkel, Schienen und Fussglieder wenigstens obenauf schwarzbraun; die mittlern Beine sind verloren gegangen; an den hintersten aber haben Schenkel und Schienen auch nur die äussersten Spitzen, die Fussglieder hingegen ihre Spitzen viel breiter und ringsum bräunlichschwarz, so dass schon vom zweiten Fussgliede nur die Wurzelhälfte, von den folgenden nur die äusserste Wurzel gelb bleibt.—Im Frankfurter Museum.

ORIGINAL DESCRIPTION OF CULEX OCHRIPES:

Fuscus. Palpis ♂ subelongatis, flavis, apice nigris. Pedibus ochraceis.

Long. 3. 1. ♀. Trompe longue d'une ligne trois quarts, jaune, à extrémité brune. Palpes un peu allongés, dépassant le tiers de la trompe, jaunes; dernier article noir, un peu renflé. Face et rostre d'un fauve brunâtre. Front brunâtre. Antennes manquant. Thorax et abdomen (dénudés) bruns. Pieds d'un jaune ferrugineux. Ailes grisâtres, à bord extérieur roussâtres.

De l'Amérique méridionale. Muséum.

ORIGINAL DESCRIPTION OF CULEX FLAVICOSTA:

Foem.: *Fulva; proboscis testacea, apice nigra; palpi testacei; antennae fuscae, basi testaceæ; pedes robusti, testacei, femoribus tibiis et tarsorum articulis apice nigris, tibiis posticis subpilosis; alae subcinereae, apice obscuriores, apud costam flavescentes, venis fuscis ciliatis.*

Tawny. Proboscis and palpi testaceous. Proboscis slender, straight, black at the tip. Antennæ brown, testaceous at the base. Legs long, stout, testaceous; tips of the femora, of the tibiæ and of the joints of the tarsi black; hind tibiæ thinly clothed with short hairs; hind tarsi, excepting the metatarsus, black, the joints testaceous at the base. Wings grayish, darker at the tips, yellowish along the costa; veins brown, ciliated. Length of the body 3½ lines; of the wings 6 lines.

Amazon Region.

DESCRIPTION OF FEMALE OF AËDES FULVUS (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather long, slender, uniform, the labellæ elongate, pointed and slender; yellowish, densely clothed with golden-yellow flattened scales, roughened towards base, extreme tip black for a short space. Palpi about one-third as long as the proboscis, slender, golden-yellow scaled, apical third black-scaled; bristles rather short, dark brown. Antennæ long; tori globose, pale yellow, with a few setæ on inner side; second joint longer than the succeeding ones which are subequal, yellowish-brown, pilose, basally whitish ringed; hairs of the whorls sparse, dark brown. Clypeus convex and bluntly rounded before, nude, brownish-yellow. Eyes black. Occiput ocher yellow, with numerous fine, narrow curved, golden-yellow scales, many long, erect, forked pale brown scales with pale golden luster on back of occiput; many pale bristles, especially along margins of eyes.

Prothoracic lobes elliptical, small but prominent, clothed with many rather short yellow setæ. Mesonotum roundedly prominent before; bright ocherous yellow, stained with dark brown, narrowly on the frontal angles and broadly over

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the posterior half, the latter area sharply limited in front by an indented line across the middle of the mesonotum, the pale color extending medianly to the antescutellar bare space; vestiture on the pale ground of narrow, curved, golden scales, giving place to black ones behind the middle on the dark lateral ground-color; numerous pale golden bristles in two lines on the disk, marginally and over roots of wings. Scutellum trilobate, dark brown, the middle lobe roundedly prominent, many narrow, curved, black and golden-yellow scales on the middle lobe and a few of the same color on the lateral lobes; middle lobe with about eight golden bristles, lateral lobes with about four. Postnotum elliptical, prominent, dark yellow, nude. Pleuræ shining, ocher yellow, with two broad, dark brown transverse bands, the upper from the anterior angle of mesonotum, between them a large patch of broad white scales and a few pale bristles; coxæ yellow, concolorous with legs, with patches of golden-yellow scales and long yellow hairs.

Abdomen subcylindrical, rather slender, posteriorly depressed and tapering, dark brown, rather densely clothed with deep golden-yellow scales, bronzy shaded on posterior margins of segments; some specimens show distinct broad, dark-brown, apical, medianly produced bands; venter similarly colored, unbanded; setæ numerous, short, golden brown.

Wings long and rather narrow, membrane smoky, stained with brown along basal half of fifth vein and lower end of cell, yellowish along the costa nearly to apex; petiole of second marginal cell shorter than the cell, that of second posterior proportionately longer, but still not as long as the cell; basal cross-vein distant about its own length from anterior cross-vein; scales of the veins narrow, broader and lanceolate towards tip of wing, yellow along the costa, subcosta and first vein to the apical fifth of wing; the remaining veins with dull brown scales; fringe dull brown. Halteres with pale stems and blackish knobs, extreme apices with pale scales.

Legs long and rather slender, ochreous, clothed with golden-yellow scales and with short brown bristles; tips of femora with black suberect scales; tibiæ and hind tarsi with tips of all the joints brownish-black scaled; fore and mid tarsi entirely golden scaled; hind tibiæ and base of first tarsal with rather sparse, long, erect, shaggy blackish-tipped scales, the following tarsal joints smooth. In some specimens the first three joints of the fore tarsi are dark scaled at their apices, the last two entirely dark scaled, the mid tarsi with the last three joints dark at their apices, hind tarsi with the last three joints dark scaled; others show intergrades in the amount of brown shading on the tarsi. Claw formula, 1.1–1.1–0.0.

Length: Body about 5.5 mm.; wing 5 mm.

Dr. Goeldi describes and figures the eggs. They are of typical *Aëdes* form, broadly and sharply fusiform, more convex on one side than on the other, densely granular, black. Size about 0.5 mm. × 0.3 mm. Laid singly. Mr. Busck bred a specimen from water in bamboo, but the larval skin is not at hand.

Central America to Brazil; absent from the Antilles.

Cacao, Trece Aguas, Alta Vera Paz, Guatemala, April 15, 1906 (Schwarz & Barber); Bluefields, Nicaragua (W. F. Thornton); Tabernilla, Canal Zone, Panama, July 18, 1907 (A. Busck); Tabernilla, Canal Zone, Panama (A. H. Jennings); Gatun, Canal Zone, Panama, January 11, 1909 (A. H. Jennings); Trinidad, West Indies (F. W. Urich); Pará, Brazil (C. F. Baker). The species is reported also from Tabatinga, State of Amazonas, and Murutucú, State of Pará, Brazil (Peryassú); Rio de Janeiro and São Paulo, Brazil (Lutz).

Wiedemann's description appears to agree with the species before us, although he makes no mention of the raised scales on the hind legs (these are very inconspicuous) nor of the structure of the claws. Giles, Theobald, and Blanchard

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have identified Walker's *Culex flavicosta* with this species and have placed it in the genus *Tæniorhynchus*. The tarsal claws are said to be simple (from an examination of Walker's type) and the wing-scales broad, causing the reference to *Tæniorhynchus*. The species before us has toothed claws and narrow wing-scales. Without an examination of Wiedemann's type it is impossible to be certain of the identification, but we have adopted that of Mr. Coquillett pending further information about this rare species. Its colorational resemblance to *Aëdes bimaculatus* Coquillett is close. We have included the synonyms *Culex ochripes* Macquart and *Culex flavicosta* Walker, given by Theobald. His statement that the claws of *flavicosta* are simple is erroneous; Mr. Busck has examined Walker's type of *flavicosta* in the British Museum and reports that the front and middle claws are plainly toothed.

The specimens before us show considerable variation in coloration. The specimen from Trinidad shows the abdomen unbanded and covered entirely with dull ochraceous scales. In this specimen the vestiture on the femora and tibiæ of the hind legs is long and shaggy, as in *Psorophora*, and this led Coquillett to refer the species to that genus. It is, however, clearly an *Aëdes*, the raised scales having been developed independently. The specimens from Panama and Guatemala show hardly a trace of raised scales on the hind legs, while single ones from Nicaragua and Pará, Brazil, are intermediate in this respect. There is no coördination between the variation in coloration and in the leg scaling; we are inclined to believe that the raised scales of the legs are very dehiscent and that the specimens discussed are all conspecific. Goeldi has created the genus *Chrysoconops* for *Aëdes fulvus* on account of its striking coloration. Theobald adopted this genus and included in it certain old world species of *Mansonia* which have similar coloration.

AËDES CAMPESTRIS Dyar & Knab.

Aëdes campestris Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 213, 1907.
Aëdes campestris Knab, Smiths. Misc. Colls., quart. iss., I, 546, 1908.
Aëdes campestris Theobald, Mon. Culic., v, 485, 1910.

ORIGINAL DESCRIPTION OF AËDES CAMPESTRIS:

♀.—Proboscis straight, clothed with black scales and, on the basal half, with a sprinkling of yellowish gray ones; palpi short, black scaled with lighter scales intermixed; occiput pale ocher-yellow, a dark brownish stripe on each side of the median area, margins of the eyes lighter scaled, collar dark scaled; prothoracic lobes, pleura and coxae roughly yellowish white scaled; mesonotum ochreous yellow, a broad rich brown stripe down the middle, basally two short brown stripes on each side of this; shoulders broadly marked with brown; scutellum pale ochreous scaled, the setae pale shining yellow; abdomen dull yellowish white scaled, the second, third, fourth and fifth segments with large patches of black scales on each side of the middle, reaching the apex but not the base, these patches have a few whitish scales intermixed, on the succeeding segments these patches are indicated by a slight sprinkling of black scales, beneath the abdomen is entirely yellowish white scaled; legs with femora and tibiae pale ochreous yellow scaled with a sprinkling of black scales, which becomes heaviest towards the apices of the tibiae, first tarsal joint yellowish scaled sprinkled with black, the black becoming heavier towards the apex, the apex ringed with yellow-white, second third and fourth joints blackish above, ringed at both ends with yellowish white, the last joint entirely yellowish white, the tarsi show a brassy luster which tends to obscure the markings, on the fore tarsi the markings are more or less obsolete; wing-veins clothed with narrow dull yellowish white scales with a slight sprinkling of black ones. Claws all toothed. Length, 5 mm.

♂.—Palpi about as long as the proboscis, clothed with yellowish and dark scales intermixed, the pale scales predominating, the apical half with lateral long dense ferruginous and brown hairs with silky luster; antennae rather short, densely plumose, the hairs pale brown and ferruginous with silky luster; abdomen long, depressed on the apical half, clothed with dull yellowish white scales, the lateral hairs abundant, pale yellow with silky luster. Length, 5.5 mm.

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Fourteen specimens, Oxbow, Saskatchewan, Canada (F. Knab); Regina, Carnduff and Qu'Apelle, Saskatchewan, Canada (T. N. Willing, through Dr. J. Fletcher); Elsinore, Utah (E. S. G. Titus); Salt Lake, Utah (H. S. Barber).

Type.—No. 10874, U. S. National Museum.

DESCRIPTION OF FEMALE AND MALE OF AËDES CAMPESTRIS (LARVA UNKNOWN):

Female.—Proboscis rather stout, uniform; labellæ conically tapered; vestiture wholly black on outer half, intermixed with whitish toward base; setæ minute, curved, black, those on the labellæ more prominently outstanding. Palpi one-fourth as long as proboscis, rather roughly scaled, dark brown intermixed with whitish. Antennæ moderate, the joints subequal, rugose, pilose, black, second joint longer than the following ones; tori subspherical, with a cup-shaped apical excavation, luteous brown, largely covered with small whitish scales. Clypeus rounded triangular, dark brown, nude. Eyes black. Occiput densely clothed with narrow straw-colored scales, broader on the sides, vertex with many dense, rather short, erect forked scales, pale brown centrally, a few on the posterior and lateral edges of the tuft black; a row of coarse, pale brown setæ along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with narrow straw-colored scales and dark brown bristles. Mesonotum black, densely clothed with narrow curved scales, pale straw-color, except a broad median stripe from near the anterior edge to posterior third and a patch on each side of this behind the middle which are bronzy-brown; vestiture of lateral areas also brown; scutellum trilobate, densely clothed with narrow, curved, straw-colored scales, each lobe with a group of yellowish bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ dark brown, coxæ luteous, densely clothed with broadly lanceolate, somewhat roughened, dull creamy white scales.

Abdomen subcylindrical, tapering at tip, depressed; dorsum clothed with whitish and black scales, the pale scales greatly predominating, the black ones being present as diffused paired segmental subdorsal patches; venter largely yellowish-white scaled, a few black ones intermixed in the median area. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell about as long as its cell; basal cross-vein distant about its own length from anterior cross-vein; scales of veins long, dense, broadly linear to narrowly triangular, yellowish-white and black, the yellowish-white largely predominating, the black scales evenly intermixed on all the veins. Halteres pale with darker knobs.

Legs slender; femora and tibiæ clothed with yellowish-white scales with a small proportion of black ones intermixed; tarsi with more numerous black scales, the second to fifth hind tarsal joints black with yellowish-white rings at their bases and apices, the last joint almost or wholly yellowish-white; fore tarsi with last three joints dark; mid tarsi with third to fifth joints with narrow basal rings. Claw formula, 1.1–1.1–1.1.

Length: Body about 6 mm.; wing 5 mm.

Male.—Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, especially the basal ones; hairs of whorls long, dense, blackish and brown. Proboscis straight, slender. Palpi a little longer than the proboscis, enlarged towards extremity, the last two joints and the end of the long joint with long, dense, black and yellowish-ferruginous hairs. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells longer; vestiture very sparse. Abdomen long, depressed; dorsal vestiture almost wholly whitish; lateral ciliation dense, long, yellowish. Claw formula, 1.1–1.1–1.1.

Length: Body about 6.5 mm.; wing 5 mm.

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Genitalia (plate 26, fig. 178): Side-pieces nearly three times as long as wide, tips rounded; outer lobe long, low; basal lobe small, convex, rounded, finely setose. Clasp-filament moderate, slightly swollen mesially, a long terminal articulated spine, and three small setæ on the outer side before the tip. Harpes elliptical, with revolute margins, tip revolute, thickened, pointed, the point directed outward. Harpagones with columnar stem reaching to middle of basal lobe of side-piece, an articulated terminal filament, broadly ligulate, narrower on its basal third, its tip pointed. Unci invisible. Basal appendages small, approximate, each bearing five setæ.

Like the other species of *Aëdes* occurring on the northern prairies, the larvæ develop in the snow-water in the early spring. The species appears to be rather rare and no larvæ have been obtained. Mr. Knab, in June, obtained females that came to bite in the daytime and males by beating bushes.

Prairies of Western Canada to Utah.

Oxbow, Saskatchewan, Canada, June 18, 1907 (F. Knab); Qu'Appelle, Saskatchewan, Canada, June 9, 1901 (T. N. Willing); Carnduff, Saskatchewan, Canada, May 28, 1901 (T. N. Willing); Regina, Saskatchewan, Canada, June 14, 1904 (T. N. Willing); Salt Lake, Utah, June 26 (H. S. Barber); Elsinore, Utah, August 6, 1907 (E. S. G. Titus).

AËDES ONONDAGENSIS (Felt).

Culex curriei Coquillett (in part), Can. Ent., xxxiii, 259, 1901.
Grabhamia curriei Theobald (in part), Mon. Culic., iii, 249, 1903.
Culex onondagensis Felt, N. Y. State Mus., Bull. 79, 278, 304, 1904.
Culicada onondagensis Felt, N. Y. State Mus. Bull. 79, 391*b*, 1904.
Culex curriei Blanchard (in part), Les Moustiques, 285, 1905.
Grabhamia curriei Dyar (not Coquillett), Journ. N. Y. Ent. Soc., xiii, 28, 54, 1905.
Grabhamia onondagensis Dyar, Proc. Ent. Soc. Wash., vii, 48, 1905.
Culex curriei Britton & Viereck (not Coquillett) Rept. Conn. Agr. Exp. Stat., 1904, 271, 1905.
Aëdes quaylei Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 191, 202, 1906.
Culex curriei Quayle (not Coquillett, in part), Ent. News, xvii, 4, 1906.
Culex lativittatus Coquillett, Ent. News, xvii, 109, 1906.
Ochlerotatus lativittatus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 20, 1906.
Ochlerotatus onondagensis Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.
Aëdes quaylei Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 6, 1906.
Ochlerotatus lativittatus Quayle, Bull. 178, Univ. Calif. Agr. Exp. Stat., 34, 1906.
Aëdes quaylei Dyar, Proc. U. S. Nat. Mus., xxxii, 127, 1907.
Culicada onondagensis Theobald, Mon. Culic., iv, 340, 1907.
Culex (*Grabhamia ?*) *lativittatus* Theobald, Mon. Culic., v, 280, 1910.
Culicada onondagensis Theobald, Mon. Culic., v, 302, 1910.

ORIGINAL DESCRIPTION OF CULEX ONONDAGENSIS:

A specimen of this mosquito was taken in the vicinity of Lake Onondaga, Syracuse, Sep. 19, 1904 and as it differs so markedly from previously known forms, it is described herewith.

Antennæ dark brown, sparsely clothed with fine whitish hairs, with sparse basal whorls of dark brown hairs on the segments, basal one brown, clothed internally with yellowish scales. Palpi, short, dark brown, with a few silvery white scales toward the apex. Apical portion of proboscis dark brown, basal part lighter with a few whitish scales. Occiput rather thickly clothed with yellowish and silvery scales, with a few black ones interspersed. Prothorax ornamented with a thick covering of golden yellowish scales, becoming grayish posteriorly (in the specimen this portion is somewhat rubbed). Scutellum similarly clothed and with no long setæ. Halteres capitate, basal and apical portions fuscous. Pleura brownish, clothed with rather thick irregular patches of whitish scales. Abdomen dark brown, with a distinct broad median and somewhat broken lateral stripes of silvery gray scales slightly tinged with yellow. Basal bands of first and second abdominal segments somewhat indistinct, those of the third and fourth well marked, the dorsum of the remaining segments nearly covered with silvery white scales. Ventral surface sparsely clothed with silvery gray and yellowish scales. Femora and tibiæ mostly yellowish with somewhat brown scales, which are flecked where thick with

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white. Fore and mid tarsi brown with apical white rings, hind tarsi with the apex and the extremities of the segments distinctly ringed, except the distal of the fourth, fifth snow white. Claws unidentate. Wings hyaline, clothed with intermixed brown, straw yellow and colorless scales, the narrow long ones mostly transparent. Petioles of the first and second fork cells about three fourths the length of their respective cells.

ORIGINAL DESCRIPTION OF AËDES QUAYLEI:

This species is the salt marsh form of the Pacific Coast, as shown by Quayle. The types of *curriei* were from diverse localities, but the North Dakota specimen must be regarded as the actual type in restricting it. This form has never been bred; it cannot be the same species as the Californian salt marsh species. It may be conspecific with the specimens from New York mentioned above under *A. grossbecki*, but this has yet to be proved.

The following is an abstract of the table:

1.	Air tube with the tuft beyond the pecten	8
8.	Pecten of the air tube with evenly spaced teeth	13
13.	Comb scales more numerous to many in a patch	21
21.	Anal segment not ringed by the plate	31
31.	Tube three times as long as wide or less	32
32.	Anal plate covering more than half the segment; anal gills moderate	33
33.	Comb scales bluntly ended, the median spine resembling the others.	40
40.	Antennæ normal, short, stout	41
41.	Antennæ spinulated	42
42.	Anal gills very short, bud-shaped	*quaylei*

ORIGINAL DESCRIPTION OF CULEX LATIVITTATUS:

So very similar to *curriei* that I am unable to detect any difference, except in the stripe of brown scales in the middle of the mesonotum. In the present species this stripe is very broad, covering more than one-fifth of the width of the mesonotum, the borders almost parallel and well marked. In *curriei* this stripe is much narrower, covering less than one-ninth of the width of the mesonotum, its borders not well defined, usually with a narrow line of brown scales on either side of it, but separated by a stripe of yellowish white scales.

Santa Clara and Alameda Counties, California. A large series of both sexes received from Miss Isabel McCracken.

This is evidently the species referred to by Mr. Quayle in the January number of the NEWS, under the name of *curriei*. The latter appears to be a fresh-water species. Mr. Frederick Knab informs me that the larvae of the two forms are very distinct.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES ONONDAGENSIS:

Female.—Proboscis moderate, subcylindrical, uniform, labellæ conically tapered; vestiture of blackish-brown scales, blacker on the labellæ; setæ minute, curved, black. Palpi short and stout, about one-fourth as long as the proboscis; vestiture black with a few white scales intermixed; setæ rather long and black. Antennæ moderate, with the joints subequal, rugose, pilose, blackish, the second joint a little longer, with a yellow base; tori subspherical, with a cup-shaped excavation, largely shaded with blackish, the inner half covered with small, flat, sordid white scales. Clypeus rounded-triangular, prominent, black, nude. Eyes black. Occiput rather broad, black, densely covered with narrow, curved, coarse scales, nearly pure white in a broad median zone, brown laterally, a patch of flat blackish ones on the sides, many erect, broad and rather short, white forked scales centrally, a few black ones laterally.

Prothoracic lobes narrowly elliptical, remote dorsally, clothed with narrow coarse dark-brown scales at tip, whitish ones below, and with short brown bristles. Mesonotum black, densely clothed with coarse, narrow, curved, dull-yellowish scales laterally, golden-brown ones in a broad median stripe, a marginal stripe of the same color from anterior angles to near root of wing, a short stripe behind on either side of antescutellar space; scales paler in the region of antescutellar space; bristles dark brown. Scutellum trilobate, luteous, clothed with coarse creamy white scales, each lobe with a group of about twelve pale

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bristles. Postnotum elliptical, prominent, nude, blackish, with a slight pruinosity. Pleuræ and coxæ brownish, clothed with flat white scales and pale bristles.

Abdomen subcylindrical, flattened, posterior segments tapering; dorsal vestiture of flat sordid-white scales, with two large patches of black ones on each segment, the patches becoming smaller posteriorly and absent on last segment; first segment with a large patch of white scales and with many long, white hairs; venter clothed with sordid-white scales, a very narrow median broken line of black ones or row of rather large black spots; cerci black; setæ mostly pale.

Wings rather broad, hyaline; petiole of second marginal cell somewhat shorter than its cell, that of second posterior cell also somewhat shorter; basal cross-vein distant about its own length from anterior cross-vein; vestiture of black and white scales; on the costal, subcostal and first veins and on the basal half of the fifth vein these scales are evenly intermixed, on the second vein and fourth vein to its fork the scales are almost entirely white, while on the third vein, the forks of the fourth vein, and the ends of the forks of the fifth vein they are almost wholly black; outstanding scales narrowly lanceolate, both black and white; fringe dark with a white reflection which gives a mottled appearance. Halteres yellowish, with white-scaled knobs.

Legs rather slender; femora clothed with whitish scales, mixed with a few black ones dorsally, these predominating at apex, extreme tip narrowly white; tibiæ with whitish scales with black ones intermixed which tend to form lines dorsally and ventrally and a small annulus before tip of hind ones; tarsi black scaled, with a white ring at base and apex of each joint; hind tarsi with the first joint also largely white scaled in the middle and the last joint largely white; fore tarsi with apex of second and all of last three joints black; mid tarsi with apex of third and all of last two joints black. Claw formula, 1.1–1.1–1.1.

Length: Body about 5 mm.; wing 4.7 mm.

Male.—Palpi exceeding the proboscis by nearly the length of the last joint, which is somewhat swollen; vestiture blackish with white scales intermixed; end of long joint and last two joints with long blackish-brown hairs. Antennæ plumose, the last two joints long and pilose, the rest short, blackish at insertions of hair-whorls; hairs long and dense, brown and black. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells a little longer; vestiture less abundant. Abdomen long, depressed, with dense, pale, lateral, ciliation. Claw formula, 2.1–1.1–1.1.

Length: Body about 6 mm.; wing 4 mm.

Genitalia: Side-pieces more than twice as long as wide, apical lobe well developed, rounded, running uniformly down to base; basal lobe quadrate, protuberant, clothed with short coarse setæ from tubercular bases, from its lower angle a stout thick spine and a shorter divided one. Clasp-filament slender, long, swollen medianly, distally serrate and bearing several short setæ, a long slender articulated terminal spine. Harpes rather narrow, concave, slightly curved, margins revolute, inner one thickened, curved over at tip in a short point. Harpagones slender, columnar, uniform, with an articulated filament at apex which is ligulate, a little expanded beyond middle and tapered to a point at tip, shaft with a few setæ. Unci approximate with revolute margins forming a short stout cone. Basal appendages narrow, with four stout spines at the tip.

In the race *onondagensis* the stem of the harpago is slender, as in *curriei* (plate 28, fig. 189); in the race *quaylei* it is stouter (plate 28, fig. 190).

Larva, Stage IV (plate 121, fig. 419).—Head rounded, narrowed before eyes, the front margin arcuate. Antennæ subcylindrical, small, slightly tapered, rather densely spined all over; a small tuft before middle; four spines at tip, two of which are slightly subapically removed; a short process. Eyes large, trans-

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verse, pointed. Both pairs of dorsal head-hairs single, rather long; ante-antennal tufts multiple. Mental plate triangular, rounded at tip; central tooth rounded, with eleven on each side, the first four short and rounded, the successive ones more pointed and more remote. Mandible quadrangular, elongate; a patch of small spines at base; four filaments near tip, two large and two small feathered ones; an outer row of cilia from a collar; nine filaments on outer edge, the two nearest collar feathered; dentition of four teeth, the outer long; two short and two long processes before, a group of minute ones at base, a broad serrate filament and three slender ones within; three spines below, then the cleft-furcate process with scattered hair-tufts; three large setæ within; a prominent angle below, a row of long hairs at base. Maxilla elongate hemispherical, divided by a suture; inner half densely haired; a large tuft at apex; outer half with hairs at tip and two filaments near suture; palpus three times as long as wide, appressed to maxilla, four small digits at tip. Thorax rounded, wider than long; hairs abundant, but not long, the prothoracic subdorsal ones multiple. Abdomen moderate, the anterior segments shorter, segments 3 to 7 dorsally with transverse rows of minute spicules; lateral hairs triple on first four segments, double on fifth and sixth. Tracheal tubes broad, band-shaped. Air-tube moderate, about three times as long as wide; pecten dense and evenly spaced, running to near middle of tube, followed by a multiple hair-tuft; single tooth a long spine with broad base and three to five basal branches. Lateral comb of eighth segment of many scales in an elongate patch; single scale broad, with fringe of long spinules, the central ones equal, none differentiated. Anal segment longer than wide, with a large dorsal plate reaching halfway down the sides, slightly emarginate at sides; dorsal tuft a hair and brush on each side; ventral brush well developed, a few tufts preceding barred area. Anal gills very short, bud-shaped.

On the flat marshes of the Pacific coast the larvæ of the race *quaylei* occur in pools of salt water left by high tides. A set of larvæ appears after each high tide. Mr. Quayle has published the following:

"The eggs of this species are laid, so far as our observations go during the past year, in the mud of pools which are formed by the monthly high tide, and which dry up before the succeeding high tide reaches them. This was demonstrated several times during the season by taking mud from such pools and submerging it with ordinary sea water, when the wrigglers would appear in from three to four days. Another method of determining this egg-laying habit consisted in sinking ordinary soap boxes, the bottoms first being removed, to a depth of two or three inches in the mud of pools where larvæ were likely to appear. These boxes were thoroughly screened on the top to prevent any possible entrance of adults, and were kept from floating away with the high tides by means of stakes driven into the ground. When the high tide reaches the pool the mud inclosed by the box would be covered with water through seepage from below, the box being high enough to allow no water to enter at the top, thus allowing no possible chance for the eggs to be deposited in the water. In a few days larvæ would appear in the box in as great numbers proportionally as in the pool outside the box. This egg-laying habit was further verified by the fact that throughout the season there were no instances recorded where larvæ appeared in permanent pools, or, at least, where there was not a perceptible lowering of the water, where eggs could be laid at the borders. . . . .

"Larvæ in the smaller pools appeared more abundantly each month until June, despite the fact that no adults were seen in the vicinity during the present season. This can be accounted for only through the fact that the eggs which were laid during the previous season did not all hatch with the high tides of early spring, the great majority not appearing until the higher temperature of May and June.

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"The larvæ of this species are not confined to brackish water only, or to normal sea water, but may develop abundantly in water of a higher saline content than even sea water. The water in a number of instances where . . . larvæ were found tested 4.5 per cent of salt, or 1 per cent higher than normal sea water. . . . .

"The typical places where . . . larvæ were found were the pools and depressions bordering the edge of the marsh, where only the water of the monthly high tide found its way. After the rains had ceased in the spring the broods appeared as regularly as the tides themselves. . . . These larvæ were first seen on February 20th in 1905, and the last brood in 1904 disappeared on September 25th. They were generally found in pools or situations which contained rather clean water, but in the diked area they were found in water highly impregnated with a reddish mineral deposit, probably ferric iron. . . . .

" [The adult] hatching from its breeding place on the salt marsh, makes its way inland, usually in the direction of favorable winds. During June, 1904, they were found abundantly in the hills . . . a distance of 10 miles from the salt marsh. They are active all day, but particularly late in the afternoon and early evening, when there is but little wind. They have been seen to congregate in innumerable numbers in the wooded cañons of the hill slopes . . . and make life interesting for man as well as stock. This species is particularly bold and vicious, and does not hesitate to thrust its beak through a couple of thicknesses of clothing. It is not as troublesome in houses and is seldom found there, but prefers the sheltered places out of doors."

On the Pacific coast the species is only locally abundant, since flat salt-marshes are essential to its occurrence, and most of that coast is high and rocky. Dr. Dyar and Mr. Caudell observed the species at Eureka, California, and at various points on Puget Sound. To the south of San Francisco Bay the species did not occur, its place being taken by *Aëdes tæniorhynchus*.

We have larvæ identical with those from the Pacific coast collected at Ithaca, New York, but we have no data on their habits. We have not seen larvæ from the Atlantic coast and have no information on their habits beyond the fact that the imagos appear at certain times in large numbers.

Pacific and Atlantic coasts of United States and Canada; central New York State.

Stanford University, California, September 15, 1901 (I. McCracken); Oakland, California, July 24, 1903 (I. McCracken); Arden, California, July 19, 1903 (I. McCracken); San José, California, July 25, 1906 (I. McCracken); Eureka, California, July, 1906 (A. N. Caudell); Tacoma, Washington, August 1, 1906 (Dyar and Caudell); Vancouver, British Columbia, August 6, 1906 (Dyar and Caudell); Duncans, British Columbia, August 8, 1906 (Dyar and Caudell); Qualicum, British Columbia, July 20, 1903 (J. Fletcher); Nanoose Bay, British Columbia, August 1, 1903 (J. Fletcher); Ithaca, New York, May 16, 1900, May, 1903, July 26, 1901, July 29, 1903 (O. A. Johannsen); Boston, Massachusetts, July 16, 1906 (C. W. Johnson); West Peabody, Massachusetts, August 13, 1911 (A. N. Caudell); Delta, Louisiana, June 20, 1904 (E. S. G. Titus). The species is reported also from Syracuse, New York (Felt) and New Haven, Connecticut (Britton and Viereck).

Aëdes onondagensis agrees in coloration characters of the imago with *Aëdes curriei* and shows the same extremes in variation. The light color of the thorax varies from greyish white through ocherous yellow to brownish yellow; the brown markings vary greatly in extent, intensity and definition and may become almost obsolete. The abdominal coloration varies in the same manner as in *Aëdes curriei, A. spencerii* and other similarly ornamented species; the dorsum may be nearly wholly black, with only narrow segmental pale margins, or it may

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be entirely pale grey; in typical specimens the black is divided by a median stripe of pale scales. Coquillett separated the present species (under the name *lativittatus*) from *curriei* on the broader median thoracic stripe. This character is equally variable in both forms and the stripe varies from very broad to very narrow in different specimens of each. The scales of the occiput are usually nearly pure white, but in some of the specimens from the Pacific coast they are distinctly ochraceous.

There is no reliable imaginal character by which this species can be separated from *Aëdes curriei* and the European *Aëdes dorsalis* (Meigen). The separation of *onondagensis* and *curriei* rests upon slight larval characters. The larvæ of *onondagensis* have both pairs of dorsal head-hairs single, the skin of the abdomen covered in part with transverse rows of minute chitinous spicules, the comb-scales of the eighth abdominal segment broadly rounded and with a uniform fringe of long spinules, and the anal gills very short, bud-like; in *curriei* the dorsal head-hairs are multiple, the skin of the abdomen is smooth, the comb-scales are smaller, with a short fringe and distinct central spine, and the anal gills are normal. *Onondagensis* breeds in salt water along the sea-coasts or inland, presumably where there is salt water; *curriei* breeds in temporary pools of snow-water or rain-water on our prairies, sometimes with a considerable content of alkali.

Two races of *Aëdes onondagensis* are indicated by differences in the male genitalia and these races are separated distributionally by a wide stretch of territory. In the form from the Pacific coast the stems of the harpagones are much thicker than in the specimens from New York State; the Pacific coast race takes the name *quaylei* Dyar and Knab. In the New York specimens (race *onondagensis*) the genitalia agree in every respect with those of *curriei*. We have seen no males or larvæ from the Atlantic coast and associate the females we have from there with *onondagensis* merely on probability; the same applies to two females from the mouth of the Mississippi River.

Aëdes dorsalis of Europe agrees closely in the coloration of the imago with our *onondagensis* and *curriei*. We have a male and female through the kindness of the late Professor Meinert of Copenhagen. On the wings of the female the dark scales are much more numerous and evenly distributed than in our two species, but as the coloration of the wing-scales is exceedingly variable in our American forms we doubt that this difference is constant. We have mounted the genitalia of the male *dorsalis* from Denmark and find them indistinguishable from *curriei* and typical *onondagensis*. It is probable that either *curriei* or *onondagensis* is identical with *dorsalis*, but as the forms are differentiated on larval characters this question can only be decided by a knowledge of the European larvæ. Moreover, there is every probability that in Europe two species have been included under the name *dorsalis*, one of them maritime, the other occurring inland. *Culex dorsalis* was founded by Meigen on a female taken in the vicinity of Berlin and therefore with certainty bred from fresh water; subsequent records indicate a species breeding in salt water. This makes it highly probable that in Europe, under the name *dorsalis*, there are two forms which may or may not be identical with *curriei* and *onondagensis*. Under the circumstances we can only call attention to the probabilities and express the hope that further facts will be forthcoming to show the true status of all the forms involved.

AËDES CURRIEI (Coquillett) Dyar.

Culex curriei Coquillett, Can. Ent., xxxiii, 259, 1901.
Grabhamia curriei Theobald (in part), Mon. Culic., iii, 249, 1903.
Grabhamia curriei Theobald, Can. Ent., xxxv, 312, 1903.
Culex curriei Dyar, Proc. Ent. Soc. Wash., vi, 40, 1904.
Culicada curriei Felt, Bull. 97, N. Y. State Mus., 477, 1905.

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Grabhamia curriei Dyar, Proc. Ent. Soc. Wash., vii, 48, 1905.
Culex curriei Blanchard (in part), Les Moustiques, 285, 1905.
Grabhamia curriei Blanchard, Les Moustiques, 397, 1905.
Aëdes grossbecki Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xiv, 201, 1906.
Ochlerotatus curriei Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 20, 1906.
Grabhamia mediolineata Ludlow, Can. Ent., xxxix, 129, 1907.
Aëdes curriei Dyar, Proc. U. S. Nat. Mus., xxxii, 128, 1907.
Grabhamia curriei Theobald, Mon. Culic., iv, 285, 1907.
Aëdes curriei Knab, Smiths. Misc. Colls., quart. iss., i, 546, 1908.
Grabhamia curriei Theobald, Mon. Culic., v, 280, 1910.
Grabhamia mediolineata Theobald, Mon. Culic., v, 278, 1910.

ORIGINAL DESCRIPTION OF CULEX CURRIEI:

Head black, scales on lower parts of occiput white, on the upper part light yellow, usually a patch of golden-brown ones between, a few erect black scales and bristles on the sides, antennæ and mouth-parts dark brown, base of the former yellow; body black, scales of mesonotum light yellow, a median and usually a lateral vitta of golden-brown ones, those of the pleura white, of the abdomen yellowish-white, a pair of black-scaled spots on segments 2 to 5; femora and tibiæ yellow, brownish at the apices, covered with mixed yellowish-white and brown scales, tarsi brown, the front ones having the base and apex of the first two joints and base of the third, the middle with the base and apex of the first three joints and base of the fourth, the hind ones with both ends of the first four joints and the whole of the last one, whitish, all claws one-toothed; wings hyaline, scales of the veins mixed yellowish-white and brown, petiole of first submarginal cell about three-fourths as long as that cell; halteres yellow; length 4 to 5 mm. Five female specimens. Type No. 5798, U. S. National Museum.

Habitat.—University, N. Dakota (June, 1896; Mr. R. P. Currie, after whom the species is named); Colorado; Boise, Idaho (Mr. C. B. Sampson); and Palo Alto, Cal. (Nov. 8, 1900; Prof. V. L. Kellogg).

Near the European *C. dorsalis*, Meigen, but according to Theobald that species has simple tarsal claws.

ORIGINAL DESCRIPTION OF GRABHAMIA MEDIOLINEATA:

(Female.) Head dark brown or black, covered with long, curved, pale, almost white scales, a few ochraceous ones; bright brown flat lateral, and slender white forked scales on the occiput, some brown bristles between the eyes and around the eyes; antennæ dark brown, verticels dark brown, pubescence white, first joint testaceous, and in some lights all the joints are apparently light banded, basal joint testaceous, with slender flat white scales on the median surface; palpi black, a few white scales at the tip, and occasionally at the base of penultimate joint; proboscis black and quite long, tip black; clypeus black; eyes black and silver.

Thorax black, prothoracic lobes with long pale ochraceous curved scales (spatulate?); mesonotum covered on the median third with bright brown slender curved scales for about two-thirds in length, the caudad third with slender pale curved scales; immediately laterad of this median stripe is a broad pale stripe of rather broader curved scales, and exterior to this another stripe of brown curved scales extending to the wing joint; scutellum black, covered with long slender curved scales; pleura black, with long white spatulate scales; metanotum black.

Abdomen black, covered with black and white or "dirty-white" scales, so arranged as to make a slender median light line, transverse white bands mostly basal, but involving both segments, and on the more caudad segments are almost entirely apical, the distal segments being in some cases mostly white; white lateral spots, which are really extensions of the white scaling of the venter, and on most of the segments extend the whole length.

Legs: Coxæ and trochanters light, and white-scaled; femora white ventrally, speckled black and white dorsally, a narrow black ring just proximal to the tiny white knee spot; fore and mid tibiæ white ventrally (on the hind legs this is reduced to a white line), speckled dorsally, a little darker near the apex, but the apex light, and in the hind legs there is a distinct dark band and light apex as on the femora; metatarsi speckled, those of the fore legs having light apices, of the hind legs having both slightly lighter bases and light apices. On the fore legs the first tarsal joints are black, with basal light bands, all the other joints dark; on the mid leg the first and second joints are still a little speckled, and have white basal bands and tiny white apical spots, sometimes unbanded, third and fourth joints dark; on the hind legs the first and second joints are dark (black), with basal and apical light bands, the third has a basal light band, and the fourth is light; all ungues equal and uniserrate.

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Wings clear, speckled with black and white scales, the costa being mostly black, and the sixth long vein white, first submarginal a little longer and more narrow than the second posterior cell, the petiole in each case about half as long as the cell; mid cross-vein twice as long as the "supernumerary," and equal to the posterior cross-vein, which is about its own length distant; halteres, light stem and dark knobs.

The leg banding involves both sides of most of the joints, and in this greatly resembles *G. Curriei*, the thoracic marking suggests *G. lativittata*, but the abdominal marking is clear, in some cases being only clean-cut lines, in others a little ragged. The types do not however, suggest either species more than to indicate their close relationship, having a peculiarly tidy appearance which the others lack.

Length, 7.5 mm.

Habitat, Fort Lincoln, N. D. Taken June, July, August.

Description of Female, Male, Larva, and Egg of Aëdes curriei:

Female.—Proboscis moderate, subcylindrical, uniform, the labellæ conically tapered; vestiture of black scales mixed with a few white ones centrally; setæ minute, curved, black, those on the labellæ more outstanding. Palpi short and stout, about one-fourth as long as the proboscis; vestiture black with a few white scales intermixed; setæ rather long and black. Antennæ moderate, the joints subequal, rugose, pilose, blackish, the second joint a little longer, with a yellow base; tori subspherical, with a cup-shaped apical excavation, largely shaded with blackish, inner half covered with small flat sordid-white scales. Clypeus rounded triangular, prominent, black, nude. Eyes black. Occiput rather broad, black, densely covered with narrow curved coarse scales, dull white on the vertex, a large patch of flat brown ones laterally and continued forward along the margins of the eyes, many dull white, short, broad, erect forked scales on the nape.

Prothoracic lobes narrowly elliptical, remote dorsally, clothed with narrow coarse dark-brown scales at tip, whitish ones below, and short brown bristles. Mesonotum brown, densely clothed with coarse, narrow curved, dull white scales, a bright brown and usually narrow median stripe, a narrow stripe on either side anteriorly along the lateral margins, a short narrow stripe posteriorly on either side of antescutellar space; bristles dark brown. Scutellum trilobate, luteous, clothed with coarse dull white scales, each lobe with a group of about twelve very pale bristles. Postnotum elliptical, prominent, nude, brownish luteous, with a slight pruinosity. Pleuræ and coxæ brownish, clothed with flat white scales and pale bristles.

Abdomen subcylindrical, flattened, posterior segments tapered; vestiture of flat sordid-white scales with two large patches of black ones on each segment, the patches becoming smaller posteriorly, absent on first and last segment; venter clothed with sordid-white scales, a row of small median black spots basally on the segments and sublateral ones distally on the segments; cerci black; setæ mostly pale.

Wings rather broad, hyaline; petiole of second marginal cell somewhat shorter than its cell, that of second posterior cell a little longer than its cell; basal cross-vein distant about its own length from anterior cross-vein; vestiture of black and white scales, on the costal, subcostal, and first veins and on the basal half of the fifth vein the white scales largely predominate, on base of first and whole of second veins the scales are almost entirely white, while on the third vein, the forks of the fourth vein, and the ends of the forks of the fifth vein there are many black scales; outstanding scales narrowly lanceolate, mostly white; fringe blackish with a white reflection which gives a mottled appearance. Halteres yellowish, with a white-scaled knob.

Legs rather slender; femora clothed with whitish scales, mixed with a few black ones dorsally and predominating at apex, extreme tip narrowly white; tibiæ with whitish scales and black ones intermixed which tend to form lines dorsally and ventrally and a small annulus before the tip on hind pair; hind tarsi black-scaled, with a white ring at base and apex of each joint, first joint also

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largely white-scaled along outer and inner side, last joint white; fore tarsi with narrow basal and apical ring on first joint and basal ring on second; mid tarsi with narrow rings at bases and apices of first and second joints, and basally on third. Claw formula, 1.1–1.1–1.1.

Length: Body about 5 mm.; wing 4.7 mm.

Male.—Palpi exceeding the proboscis by nearly the length of the last joint, which is somewhat swollen; vestiture blackish with white scales intermixed, the black scales predominating at ends of joints and middle of long joint; end of long joint and the last two joints densely clothed with long blackish-brown and golden-brown hairs. Antennæ plumose, the last two joints long pilose, the rest short, blackish at insertions of hair-whorls; hairs long, brown and black. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells a little longer; vestiture less abundant. Abdomen long, depressed, with dense, long, whitish lateral ciliation. Claw formula, 2.1–1.1–1.1.

Length: Body about 6 mm.; wing 4 mm.

Genitalia (plate 28, fig. 189): Side-pieces more than twice as long as wide, apical lobe well developed, rounded uniformly down to base; basal lobe quadrate, protuberant, clothed with short coarse setæ from tubercular bases, from its lower angle a stout, thick spine and a shorter one. Clasp-filament slender, long, uniform, tips serrate outwardly and bearing several short setæ, a long slender articulated terminal spine. Harpes rather narrow, concave, slightly curved, margins revolute, inner one thickened, curved over at tip in a short point. Harpagones slender, columnar, uniform, with an articulated filament at apex which is ligulate, a little expanded beyond middle and tapered to a point at tip, shaft with a few setæ. Unci approximate with revolute margins, forming a short stout cone. Basal appendages narrow with stout short spines at tip.

Larva, Stage IV (plate 121, fig. 417).—Head transverse, rounded, widest through eyes; antennæ moderate, uniform, spinose, a small tuft near middle; both pairs of dorsal head-hairs multiple, the tuft next the antenna multiple. Lateral comb of eighth segment of about twenty-five scales in an irregular patch, each scale fringed on the sides and with a longer central spine. Air-tube about three times as long as wide, slightly tapering outwardly; pecten of fine uniform teeth running nearly to middle, followed at a slight interval by a single small tuft of several hairs. Anal segment longer than wide, with a dorsal plate reaching well down the sides and enlarged before, bearing a single hair at its posterior angles; dorsal tuft a long hair and tuft on each side; ventral brush well developed, with small tufts preceding the barred area. Anal gills rather small, tapered, the two pairs nearly equal.

Egg.—Slenderly fusiform, uniform, the micropylar end less strongly tapering than the other and with an annular cushion; color dull black, the surface covered with closely crowded, small flattened granulations.

The eggs are deposited singly on the ground where the water will collect from melting snow or rains, and remain unhatched until the following season. The larvæ live in temporary pools. In the north there is but a single annual generation in the snow-water of early spring. Southward the appearance of the larvæ is governed by the formation of pools by heavy rains and consequently occurs at irregular intervals. Irrigation operations may also produce conditions under which development takes place. The species inhabits the open arid country, its stronghold being the Montana region, although its range extends over the prairies eastward to Illinois and westward nearly to the Pacific Ocean. In Saskatchewan Mr. Knab found larvæ in the early spring in a small swamp, in several ditches along a railroad, and in pools of alkaline water that left a white

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deposit about the margin. It is not improbable that they are frequent inhabitants of alkaline pools in the arid regions.

Semi-arid regions of western United States and Canada.

Thrall, California, July 25, 1906 (Dyar and Caudell); Niles, California, August 31, 1901 (S. C. Jones); Stockton, California (H. J. Quayle); Salt Lake, Utah, June 26 (H. S. Barber); Kaslo, British Columbia, June 21, 1903 (H. G. Dyar); Market Lake, Idaho, June 18, 1901 (J. M. Aldrich); Lehi, Utah, September 9, 1905 (W. A. Hooker); Grand Junction, Utah, September 11, 1905 (W. A. Hooker); Grand Junction, Colorado, July 21, 1906 (E. P. Taylor); Florissant, Colorado, July 10, 1907 (S. A. Rohwer); Boise, Idaho (C. B. Simpson); University, North Dakota, June, 1896 (R. P. Currie); Fort Lincoln, North Dakota (through C. S. Ludlow); Blackfoot, Idaho, June 12, 1904 (E. S. G. Titus); Rockyford, Idaho, June 10, 1904 (E. S. G. Titus); Klamath Falls, Oregon, July 27, 1906 (Dyar and Caudell); Pecos, New Mexico, June 24 (T. D. A. Cockerell); Elsinore, Utah, August 6, 1907 (E. S. G. Titus); Bozeman, Montana, August 29, 1908 (R. A. Cooley); Billings, Montana, August 22, 1908 (R. A. Cooley); Dillon, Montana, August 5, 1908 (R. A. Cooley); Bigtimber, Montana, August 25, 1908 (R. A. Cooley); Joliet, Montana, August 23, 1908 (R. A. Cooley); Meadow Creek, Montana, August 5, 1908 (R. A. Cooley); Reno, Nevada, July 20, August 17 to October 17, 1915 (H. G. Dyar); Steamboat Springs, Nevada, July 31, August 19, 1915 (H. G. Dyar); Madison, Wisconsin (S. J. Holmes); Qu'Appelle, Saskatchewan, June 22, 1907 (T. N. Willing); Oxbow, Saskatchewan, May 21, 1907 (F. Knab); Carnduff, Saskatchewan, May 27, 1907 (F. Knab); Winnipeg, Manitoba, June 22, 1907 (F. Knab); Lincoln, Nebraska, May (O. A. Johannsen); Chicago, Illinois, May 4, 1900 (O. A. Johannsen).

Aëdes curriei is extremely variable in coloration. The predominating vestiture of the occiput and mesonotum varies from nearly pure white through pale yellow and ocherous to brownish yellow. The brown thoracic stripes may be well defined or diffused and likewise vary greatly in depth of color and extent. The median stripe usually stops short before the antescutellar space, but in some specimens it is continued in three or more slender lines to the scutellum. The abdominal markings vary from slight borderings of white scales on the segments to a complete covering of such scales; the most abundant and characteristic form is that with a median area of white scales, thus producing a pair of black spots on each segment. The amount of white scales on the wings likewise varies and these scales may predominate on all the veins. There is no constant colorational character to separate this species as adult from *Aëdes onondagensis*, and the larvæ, too, are much alike, differing chiefly in the head-hairs and the structure of the comb-scales; the genitalia, also, are not diagnostic. *Onondagensis* breeds in salt-water pools, *curriei* inhabits temporary pools throughout the arid regions.

For the relationships and questions of possible synonymy our discussion under *Aëdes onondagensis* should be consulted. *Aëdes curriei* was described as a species distinct from the European *Aëdes dorsalis* (Meigen) under the impression that the structure of the hind claws of the female differed, but it now appears that both are alike in this respect. Doctor Ludlow has placed a type of her *mediolineata* in the U. S. National Museum. It is the form of *curriei* with the abdominal pale markings very narrow.

AËDES ATROPALPUS (Coquillett) Dyar & Knab.

Culex atropalpus Coquillett, Can. Ent., xxxiv, 292, 1902.
Culex atropalpus Dyar, Journ. N. Y. Ent. Soc., x, 195, 1902.
Culex atropalpus Smith, Ent. News, xiii, 301, 1902.
Culex atropalpus Dyar, Proc. Ent. Soc. Wash., v, 144, pl. ii, f. 10, 1903.
Culex atropalpus Dyar, Ent. News, xiv, 180, 1903.

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Culex atropalpus Johannsen, Bull. 68, N. Y. State Mus., 416, 1903.
Culex atropalpus Smith, Bull. 171, N. J. Agr. Exp. Sta., 38, 1904.
Culex atropalpus Dyar, Journ. N. Y. Ent. Soc., xii, 172, 1904.
Culex atropalpus Felt, Bull. 79, N. Y. State Mus., 278, 280, 305, 1904.
Culicada atropalpus Felt, Bull. 79, N. Y. State Mus., 391*b*, 1904.
Culex atropalpus Smith, N. J. Agr. Exp. Stat., Rept. Mosq., 260, 1905.
Culex atropalpus Britton & Viereck, Rept. Conn. Agric. Exp. Stat., 1904, 269, 272, 273, 1905.
Culicada atropalpus Felt, Bull. 97, N. Y. State Mus., 448, 449, 477, 1905.
Culex atropalpis Blanchard, Les Moustiques, 628, 1905.
Grabhamia atropalpus Dyar, Proc. Ent. Soc. Wash., vii, 48, 1905.
Aëdes atropalpus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 189, 192, 1906.
Ochlerotatus atropalpus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 20, 1906.
Ochlerotatus atropalpus Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 4, 1906.
Culex ? atropalpus Theobald, Mon. Culic., iv, 401, 1907.
Culex (?) atropalpus Theobald, Mon. Culic., v, 396, 1910.
Aëdes atropalpus Morse, Ann. Rept. N. J. State Mus., 1909, 719, 1910.

ORIGINAL DESCRIPTION OF CULEX ATROPALPUS:

♀. Black, the halteres, apices of coxae, and bases and under side of femora, except toward the apex, yellowish white; scales of palpi black, occiput covered with broad, appressed whitish scales and with a patch of black ones near the middle of each side, the middle of the upper side covered with narrow yellowish scales, the upright forked scales yellow; scales of mesonotum golden yellow and with a median vitta of black ones; scales of abdomen purplish black, and with a narrow fascia of whitish ones at the bases of the segments, becoming much broader on the venter; scales of legs black, those at base and on under side of femora, except toward the apex, also at extreme apices of femora, both ends of tibiae and of the tarsal joints, except the last two and apex of the third on the front and middle tarsi, white, those on last joint of hind tarsi wholly white; claws of front and middle tarsi toothed, those of the hind ones simple; wings hyaline, lateral scales of the veins long and narrow, first submarginal cell slightly over twice as long as its petiole.

♂. Colouring as in the female, except that the short joints of the antennae are ringed with white; palpi two-thirds as long as the proboscis, slender, the apex blunt, last two joints less than half as long as the remaining portion, and bearing a few rather short hairs; claspers of nearly an equal thickness, evenly covered with hairs, and with a long, slender, curved claw at apex of each; fourth joint of front and middle tarsi as broad as long; larger claw of front and middle tarsi one-toothed, the smaller one and the claws of the hind tarsi simple.

Length, 3.5 to 4.5 mm. Thirty-seven females and three males. Type No. 6558, U. S. National Museum.

Habitat.—Richmond, Va. (Sept. 26: E. G. Williams); Plummer's Isd., Montgomery Co., Md. (May 18 to Aug. 14: R. P. Currie and H. S. Barber); Shenk's Ferry, Pa. (Oct. 21: S. E. Weber), and White Mts., N. H. (H. K. Morrison).

Near *Canadensis*, but readily distinguished by the colour of the scales on the palpi and mesonotum.

DESCRIPTION OF FEMALE, MALE, EGG, LARVA, AND PUPA OF AËDES ATROPALPUS:

Female.—Proboscis rather long, slender, cylindrical; vestiture black. Palpi short, less than one-fifth as long as the proboscis; vestiture black, scales rough, setæ short. Antennæ moderate, black, rugose, pilose, distal joints longer than basal ones, second one slightly elongate and stouter, its base pale; tori subspherical, with a cup-shaped apical hollow, brown shaded with black, a patch of pale scales on inner side. Clypeus elliptical, prominent, brownish, nude. Eyes black. Occiput narrow, black, densely clothed with white scales only a few of which in the center are narrow, curved, most being broad, a triangular black patch on the middle of the sides, a few small pale erect forked scales on vertex; bristles bordering the eyes small, black.

Prothoracic lobes moderate, remote, black, clothed with coarse, narrow, whitish scales and brownish bristles. Mesonotum black, clothed with rather coarse, narrow, curved scales, a broad dorsal stripe not reaching anterior edge of antescutellar space dark brown, a short narrow brown stripe on each side of antescutellar space, the rest of the scales pale golden yellow; bristles brown, those over roots of wings paler. Scutellum trilobate, clothed with pale yellow scales,

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each lobe with a group of rather dark brown bristles. Postnotum elliptical, prominent, blackish, nude. Pleuræ blackish, coxæ brown, the vestiture of flat white scales and short pale bristles.

Abdomen subcylindrical, flattened, gradually tapering posteriorly, last segment small; dorsal vestiture of black scales, with a narrow band of white ones at base of each segment except the last, the pale bands widened to subquadrate patches at the sides, visible dorsally on sixth and seventh segments; first segment with white scales dorsally and many pale setæ; venter creamy white scaled, with broad, blackish apical bands, the first two segments entirely white scaled.

Wings moderate, hyaline; stem of second marginal cell much shorter than its cell, that of second posterior about equal to its cell; basal cross-vein distant a little more than its own length from anterior cross-vein; veins brown, scales black except for a short distance on costal edge at base, where they are white, the outstanding scales on apical half of wing broadly ligulate. Halteres white, with blackish, white-scaled knobs.

Legs rather long and slender, black scaled; femora black, white at base beneath and at extreme apex; tibiæ black, narrowly white at base and apex; hind tarsi black, each joint with a moderate white ring at base and apex, the last joint entirely white; fore and mid tarsi with the white markings obsolete on last three joints. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Male.—Proboscis long, slender, straight. Palpi slender, straight, not enlarged apically, about three-fourths as long as the proboscis, entirely black scaled, apex of long joint and last two joints with short and rather sparse black hairs. Antennæ plumose, the last two joints long and pilose, the others short, grayish, the incrassated rings at insertions of the whorls darker; hairs long, moderately dense, brown. Coloration similar to the female. Wings narrower than in the female, stalks of the fork-cells longer, the vestiture less abundant. Abdomen long, depressed, straight-sided, the dorsal bands broader, the last segment white scaled above; lateral ciliation rather short but coarse, blackish, abundant on distal half. Claw formula, 2.1–2.1–0.0.

Length: Body about 4.5 mm.; wing 3 mm.

Genitalia (plate 31, fig. 210): Side-pieces over twice as long as wide, broadly conical at tip, apical lobe undeveloped, basal lobe represented by an area of dense short setæ on tubercular bases. Clasp-filament long, slender, uniform with a subapical notch bearing a minute seta and a long articulated terminal spine. Harpes narrow, concave, inner margins strongly revolute, tips bent over outwardly, minutely denticulate. Harpagones with a ligulate stem which is excurved in middle and bears an apical articulated filament, slender, curved, not as long as stem. Unci forming a short stout cone with a rounded apex. Basal appendages very small, with a few minute setæ.

Egg (plate 145, fig. 667).—Black, over three times as long as thick, subfusiform, rounded at both ends, slightly flattened on one side, the surface with irregular more or less transverse wrinkles and finely granular, the whole with a gelatinous covering, a clear cushion at the micropylar end.

Larva, Stage IV (see figure of the entire larva, plate 60).—Head rounded, slightly narrowed before eyes, a slight notch at insertion of antennæ, front margin broadly arcuate. Antennæ moderate, slender, nearly uniform, sparsely spined all over; tuft of two hairs a little beyond the middle; four small terminal spines of very uneven length and a small digit on a pedestal. Eyes large but not elevated, transverse, pointed. Both pairs of dorsal head-hairs single; anteantennal tuft of four hairs. Mental plate widely triangular, the central tooth large, with ten side teeth which become larger and more distant basally to the last two, which are small. Mandible quadrangular, spined at base without; two

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filaments near tip and an outer row of cilia; fourteen closely set filaments on outer edge; dentition of four teeth on a process, three spine-shaped ones before, three blunt ones at base, a broad serrate filament and eight hairs within; process below narrowly cleft in the bulbous tip, with patches of hair and a row of stouter hairs; five filamentous hairs within and four at base. Maxilla elongate hemispherical, contracted before tip, divided by a band-shaped suture; inner half hairy, a crown of hairs at tip; outer half with a patch of hair, two filaments near suture and a spine on the other side; palpus three times as long as wide, with four digits and two irregularities at tip, one of the digits short. Thorax rounded, slightly wider than long; hairs abundant, subdorsal prothoracic ones very short. Abdomen moderate, the posterior segments more elongated; hairs rather short, lateral tufts multiple to fifth segment, double on sixth. Tracheal tubes broad, band-shaped, slightly expanded in the segments, narrowed posteriorly but with distinct segmental expansions in the seventh and eighth segments. Air-tube short and stout, tapered beyond base, hardly twice as long as wide; pecten reaching nearly to tip, the distal four or five teeth larger and detached; single tooth a long spine, broad at base, with one to four basal branches; a multiple hair-tuft a little beyond middle of tube, well within the pecten. Lateral comb of eighth segment of many scales in a triangular patch; single scale elliptical, base pointed, fringed all around, the five terminal teeth of about equal length. Anal segment as long as broad, dorsal plate reaching halfway down sides; dorsal tuft a brush and hair on either side; a single lateral hair; ventral brush well developed, but sparse, without small tufts preceding barred area. Anal gills large, very long, rather broad, with conspicuous tracheæ.

Pupa (plate 150, fig. 712).—Thoracic mass narrowly pyriform, slightly depressed at base of antennæ and behind head; thorax rugose on dorsal line; air-tubes moderate, expanded, the tips slightly notched. Abdomen stout, rather long, the basal segments strongly angled; hairs slight, subdorsal ones long on central segments, a small tuft on hind angles of eighth segment; anal paddles with a long terminal seta.

The larvæ live in pot-holes in rocks along streams, which are filled at high water or by rains, and in crevices in rocks along the shores of lakes, that are filled by waves in storms. The eggs are deposited singly on the sides of the hole, above the water-level. There are apparently several generations in a year, these depending on the raising of the water-level in the rock-pools which causes the eggs to hatch. Females confined in a glass jar laid their eggs singly on the water during the summer, but in patches adhering to the sides of the jar in the fall. The winter is passed in the egg state, the eggs being evidently firmly attached to the rocks. The larvæ develop rather slowly. They feed mostly on green algæ. Both larvæ and pupæ are unusually heavy, being little if at all lighter than the water. The larvæ therefore stay near the bottom with the greatest ease, and are doubtless enabled to stay down for long periods owing to the well-developed anal gills. Even the pupæ will rest motionless below the surface, and are not obliged to get under some object in order to remain below as most *Aëdes* pupæ do. Breeding is confined to the rock pools, and the adults are seldom taken far from the breeding-places. The females are active biters, and very annoying along some of our rocky streams. Owing to its very local occurrence and the restricted number of possible breeding-places, the species is never extremely abundant, and only troublesome locally under special conditions.

North-eastern United States.

Center Harbor, New Hampshire, September 17, 1902 (H. G. Dyar); White Mountains, New Hampshire (H. K. Morrison); Cummington, Massachusetts, July 5, 1903 (F. Knab); Westfield, Massachusetts, July 14, 1903 (F. Knab);

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Tupper Lake, New York, August (H. G. Dyar); Double Beach, Connecticut, July 21, 1904 (P. L. Butrick); Shenk's Ferry, Pennsylvania, October 21, 1901 (S. E. Weber); Plummer's Island, Maryland, June 5, 1903 (W. V. Warner); Great Falls, Maryland, August 9, 1903 (F. C. Pratt); Chain Bridge, District of Columbia, August 17, 1914 (H. G. Dyar); Difficult Run, Virginia, August 8, 1906 (Knab and Barber); Richmond, Virginia, October 26, 1901 (E. G. Williams); Saxeville, Wisconsin, June 3, 4, 20-29, July 8-11, 1909 (B. K. Miller). Reported also from Maine (Smith).

AËDES EPACTIUS Dyar & Knab.

Aëdes atropalpus Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xiv, 192, 1906.
Aëdes epactius Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 53, 1908.
Aëdes epaticus Theobald, Mon. Culic., v, 620, 1910.

ORIGINAL DESCRIPTION OF AËDES EPACTIUS:

Female.—Proboscis long and slender, black; palpi entirely black-scaled; vertex of the head anteriorly with broad whitish scales, posteriorly with darker scales; thorax deep brown-scaled, with slight bronzy luster and with whitish markings; these markings consist of two very broad outcurved bands on the anterior half of the mesonotum, which become approximated and narrowed at the middle, and run parallel with each other to the scutellum; the sides of the mesonotum and the hind margin of the scutellum are whitish-scaled; pleura with patches of white scales; abdomen black-scaled above, with rather narrow white basal bands, black and white-banded beneath; the wing-veins are clothed with long and narrow dusky scales; legs black, the knees white, involving both ends of the joints; the front legs with base and apex of the first tarsal joint and the base of the second white-ringed; middle legs with the base and apex of the first tarsal joint narrowly white-ringed, base and apex of the second joint still more narrowly so, the base of the third joint narrowly ringed; hind legs with the last tarsal joint entirely white, the remaining ones broadly white-ringed at base and apex; front and middle tarsal claws toothed, the hind ones simple. Length, 4 mm.

In the male the palpi are long, but do not attain the apex of the proboscis by about one-fourth its length, sparsely hairy, black-scaled without annulations; the head is densely whitish-scaled; the mesothoracic markings are similar to those of the female, but the white scaling is heavier; the antescutellar bare space is surrounded by white scales, which are poorly indicated in the female; abdomen black-scaled above, with basal white bands, black and white-banded beneath. Length, 4 mm.

Ten specimens from Córdoba, Mexico, and Almoloya, in the State of Oaxaca, Mexico, bred from larvæ in holes or hollows in bowlders in stream beds. (F. Knab.)

Type.—Cat. No. 11963, U. S. N. M.

This species is closely related to *Aëdes atropalpus* Coquillett, but differs in the coloration of the thoracic markings.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES EPACTIUS:

Female.—Proboscis rather long, slender, cylindrical, uniform, slightly curved, labellæ conically tapered; vestiture of black scales, setæ very small, curved, black. Palpi short and stout, less than one-fifth the length of the proboscis, clothed with black, rough scales; bristles rather long, stout, black. Antennæ moderate, the basal joints rather short, rugose, blackish, setose, second joint longer and stouter than succeeding one, pale brown, hairs of the whorls sparse, black; tori globose, with a cup-shaped apical excavation, brown, a small patch of pale scales on inner side. Clypeus blackish, prominent, nude, elliptical. Eyes black. Occiput narrow, black, clothed with sordid white scales, a few narrow curved scales in the middle, the others very broad and flat, a large patch of black ones laterally, some slender, upright, forked dark scales well back on the nape.

Prothoracic lobes moderate, remote, clothed with whitish scales and rather short dark bristles. Mesonotum black, rather densely clothed with coarse, narrow, curved scales, a broad median stripe deep bronzy brown, the lateral scales silvery white; a short brown sublateral stripe on each side near the antescutellar area. Scutellum trilobate, clothed with silvery-white scales, each lobe with a

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group of bristles. Postnotum rounded, convex, brown, slightly pruinose, nude. Pleuræ and coxæ clothed with patches of broad white scales and rows of pale bristles; pleuræ brown, coxæ luteous.

Abdomen subcylindrical, flattened, tapering posteriorly, the cerci exserted; dorsal vestiture of dull black scales, the segments with rather narrow, uniform, white basal bands, present even on the last segment; first segment with patches of flat white scales and many pale setæ; venter white scaled, a sprinkling of black ones at apices of segments, tending to form subapical bands, particularly on distal segments. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell also shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; veins brown, scales black except at base of costa, where they are silvery-white for a short distance; outstanding scales on outer half of wing linear, spatulate, black. Halteres whitish.

Legs rather long and slender; femora black, white-scaled at base and beneath, apex broadly silver-white; tibiæ black-scaled, bases and apices white; tarsi black, hind ones with broad basal and apical white rings, the last joint entirely white; fore tarsi without white rings; mid tarsi with the rings obsolete on last three joints. Claw formula, 1.1–1.1–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Male.—Palpi slender, straight, about three-fourths as long as the proboscis, black-scaled; apex of long joint and last two joints with sparse, rather short and coarse bristles. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, pale, with brown rings at insertions of the hair-whorls; hairs of whorls long, dark brown. Coloration similar to the female, the head entirely covered with sordid silvery scales, the black lateral spots being absent. Abdomen elongate, the sides densely hairy, the segmental white bands broader, the last segment entirely white scaled above. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture less abundant. Claw formula, 2.1–2.1–0.0.

Genitalia (plate 32, fig. 214): Side-pieces over twice as long as wide, tips tapered, bluntly rounded; apical lobe undeveloped; basal lobe rounded, subspherical, setose. Clasp-filament long, slender, uniform, with a long terminal spine. Harpes small, elliptical, concave, tips thickened and pointed outwardly. Harpagones with a long, slender, curved stem and smooth terminal filament, tapering to a point. Unci forming a basal cone with revolute margins.

Larva, Stage IV (plate 119, fig. 411).—Head rounded, slightly widened through eyes; antennæ small, uniform, slightly spinose, with a small hair-tuft at middle; upper pair of dorsal head-hairs double, lower pair single, ante-antennal tufts in fours. Lateral comb of eighth segment of about twenty-five scales in an irregular patch. Air-tube about three times as long as wide, slightly tapering outwardly; pecten-teeth reaching to apical third, the outer ones stouter and separated, extending beyond the hair-tuft. Anal segment longer than wide, with a rather small dorsal plate, spinose posteriorly; dorsal tuft a long hair and tuft on each side; ventral brush well developed, scarcely exceeding barred area. Anal gills longer than the segment, subequal, pointed.

The larvæ live in water in pot-holes or depressions in rocks. Mr. Knab got them in depressions in bowlders in stream beds. At Córdoba they were associated with *Aëdes fluviatilis* and *Culex pinarocampa*.

Southern Mexico.

Almoloya, State of Oaxaca, July 20, 1905 (F. Knab); Córdoba, State of Vera Cruz, January 4, 1908 (F. Knab).

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Aëdes epactius is very closely allied to *Aëdes atropalpus,* but as the adults differ in coloration we hold them separate. The larvæ are closely similar and the life-histories seem to be identical.

AËDES VARIPALPUS (Coquillett) Dyar & Knab.

Culex varipalpus Coquillett, Can. Ent., xxxiv, 292, 1902.
Culex varipalpus Dyar, Proc. Ent. Soc. Wash., vi, 39, 1904.
Culex varipalpus Hine, Can. Ent., xxxvi, 89, 1904.
Culex varipalpus Dyar, Journ. N. Y. Ent. Soc., xii, 90, 1904.
Tæniorhynchus sierrensis Ludlow, Can. Ent., xxxvii, 231, 1905.
Grabhamia varipalpus Dyar, Journ. N. Y. Ent. Soc., xiii, 54, 1905.
Culex varipalpis Blanchard, Les Moustiques, 628, 630, 1905.
Grabhamia varipalpus Dyar, Proc. Ent. Soc. Wash., vii, 48, 1905.
Culicada varipalpus Felt, Bull. 97, N. Y. State Mus., 447, 1905.
? Finlaya sierrensis Ludlow, Can. Ent., xxxviii, 132, 1906.
Aëdes varipalpus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 200, 1906.
Ochlerotatus varipalpus Quayle, Univ. Cal. Agr. Exp. Stat., Bull. 178, 50, 52, 1906.
Culex varipalpus Blaisdell, Ent. News, xvii, 107, 1906.
Ochlerotatus varipalpus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 20, 1906.
Ochlerotatus varipalpus Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 5, 1906.
Aëdes varipalpus Dyar, Proc. U. S. Nat. Mus., xxxii, 125, 1907.
Culex varipalpus Theobald, Mon. Culic., v, 365, 1910.
Tæniorhynchus (?) sierronsis Theobald, Mon. Culic., v, 432, 1910.

ORIGINAL DESCRIPTION OF CULEX VARIPALPUS:

♀. Same as *atropalpus*, with these exceptions: Scales on apices of palpi and a ring near the middle, white; occiput with two patches of black ones on each side, the upright forked ones black and whitish; first submarginal cell noticeably less than twice as long as its petiole.

Length, 3 mm. A female specimen collected July 29 by Mr. H. S. Barber. Type No. 6559, U. S. N. M.

Habitat.—Williams, Arizona.

ORIGINAL DESCRIPTION OF TÆNIORHYNCHUS SIERRENSIS:

♀. Head brown, a median line of white curved scales extending up between the eyes, immediately followed laterally by a patch of flat brown scales, a narrow white stripe laterad, followed by a brown stripe, narrow white line around the eyes, white forked and curved scales on the occiput; the general effect is of two brown submedian spots, and the curved scales are confined to this comparatively narrow median line; antennæ brown, and while not really banded, giving the effect of white bands, verticels brown, pubescence white, basal joint white scaled; palpi brown with white tips, and a narrow light band about midway; proboscis dark brown; clypeus brown; eyes brown.

Thorax brown, with fine tomentum, resembling the "frost" on some Anophelina, partly denuded, but sparsely covered with brown and white curved and spindle-shaped scales, the white scales being apparently mostly on the outer parts of the mesonotum, *i. e.*, cephalad, on the sides, and a heavy median bunch just in front of the scutellum; prothoracic lobes brown, with white curved scales; scutellum brown, such scales as remain are white curved and spatulate; pleura brown, with heavy patches of broad white scales: metanotum brown, nude.

Abdomen brown, with basal white lateral spots and basal white bands, thickened on the median line, which do not always reach all the way across, and on the penultimate segment is merely a median white spot; some segments also narrowly apically banded, apical hairs brown; ventrally mostly light scaled, and on the distal segments arranged so as to form both basal and apical bands.

Legs: coxae and trochanters brown, with light scales; femora dark, slightly speckled with white scales, the dorsal sides the darker, but on the hind legs light at the base; small white knee spot on all the legs, a little more pronounced on the hind legs; tibiae dark, sometimes a little speckled; metatarsi on all the legs with basal and apical light spots, which are very faint, sometimes missing on the fore legs and develop into well-marked basal and apical white bands on the hind legs; the fore legs are of lighter brown and the banding often very faint or missing; 1st and 2nd tarsal joints on the hind legs with apical white bands, on mid and fore legs only the 1st tarsal have apical white spots, and in the fore leg they are very indistinct; remaining joints brown; ungues simple and equal.

Wings covered with brown typical *Tæniorhynchus* scales; 1st submarginal cell nearly a half longer and a little narrower than the 2nd posterior, the stems nearly

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the same length; supernumerary cross-vein slightly shorter and slightly interior of the mid cross-vein, the posterior about the same length as mid and a little more than its own length distant; halteres light. Length, 6 mm.

Male is very like the female; palpi nearly as long as the proboscis, the ultimate joint small and basally white banded, the penultimate also basally white, otherwise the organ is brown, and is not plumose. Length, 4 mm. *Habitat.*—Sierra Nevada Mts., California.

Described from several specimens sent from Three Rivers (?), Cal., by Dr. E. J. Bingham, 1st Lt., Asst. Surg., U. S. A. The thoracic scaling at first suggests *Culex triseriatus*, Say, but the abdominal marking and the banded legs carry it away from that, and besides that the wing scales are distinctively *Tæniorhynchus* scales.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES VARIPALPUS:

Female.—Proboscis slender and rather long, cylindrical, uniform, the labellæ conically tapered; vestiture black. Palpi short, less than one-fourth as long as the proboscis, rather stout; vestiture of black scales, apex broadly white scaled and tips of the two basal joints white ringed; setæ moderate, black. Antennæ moderate, joints subequal, rugose, shining black, second joint with a small tuft of white scales within at base; tori subspherical, with a cup-shaped apical excavation, with a large patch of flat white scales on inner side; hairs of whorls moderate, coarse, black. Clypeus bluntly conical, dull black, nude. Eyes black. Occiput blackish, clothed with creamy white scales, in the middle rather broad curved ones, broad, flat appressed ones at the sides, a large patch of dark brown ones each side of middle, a smaller one well down the sides, many erect, forked, pale scales on the nape; bristles bordering eyes coarse, black.

Prothoracic lobes, moderate, remote, black, clothed with broad, flat, white scales and black bristles. Mesonotum black, clothed with dark bronzy-brown and shining yellowish-white, rather dense, coarse, curved scales, forming a variegated pattern; the pale scales form a broad, median pale golden stripe on the anterior half which spreads in front to the humeri; antescutellar bare space surrounded by silvery scales and connected with the median stripe by a narrow line of pale scales; posteriorly a narrow silvery line on each side of antescutellar space and nearly joining the median stripe; lateral margins irregularly pale scaled and near the middle sending an oblique branch to the median stripe; two narrow bare lines anteriorly; bristles rather long, coarse and black. Scutellum trilobate, blackish, clothed with broad, flat, shining white scales, each lobe with about eight black bristles. Postnotum elliptical, prominent, dull blackish-brown, nude. Pleuræ brown, coxæ pale, with broad flat white scales and pale bristles.

Abdomen subcylindrical, flattened, tapering posteriorly, the cerci exserted; dorsal vestiture of black scales, each segment with a large basal, median, roughly triangular patch of white scales and larger lateral patches which are narrowly connected basally with the median patch, the last three or four segments bear also a few apical white scales; first segment clothed with white scales and with many pale hairs; venter clothed with white scales with a few black ones intermixed, a series of subapical broad black bands, broadly interrupted medianly on all but the sixth and seventh segments; cerci black.

Wings moderate hyaline; petiole of second marginal cell a little shorter than its cell, that of second posterior about the same length as its cell; basal cross-vein about its own length distant from anterior cross-vein; scales of veins dense, long, all brown, the outstanding ones on outer half of wings broadly linear, costa with a blue reflection and a minute white spot at base; fringe dusky with a whitish luster. Halteres entirely whitish.

Legs rather long and slender; femora clothed with black and white scales, the white ones predominating basally, the black ones apically, tip broadly white; tibiæ clothed with bluish-black scales, a few white ones at extreme base and tip,

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the stiff outstanding bristles pale brownish; tarsi black, ringed with white on both ends of joints, narrowly and obscurely so on front and middle legs, of which the last three joints are wholly black, broadly and pure white, contrasting, on the hind legs, the last joint wholly white. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Male.—Proboscis slender, straight. Palpi as long as the proboscis, slender, the last two joints very slightly enlarged; vestiture black, bases of last two joints broadly ringed with white, a white patch near base of long joint; hairs on last two joints and apex of long joint sparse, small, black. Antennæ plumose; last two joints long and slender, the others short, white, a brown ring at origins of hair-whorls; hairs long and blackish, lustrous. Coloration similar to the female. Wings rather narrower than in the female, the stems of the fork-cells nearly the same, the vestiture less abundant. Abdomen elongate, densely and coarsely hairy at the sides; dorsum with the white scales forming broad, basal, segmental bands. Claw formula, 2.1–2.1–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 31, fig. 209): Side-pieces about three times as long as wide, tip conically rounded, apical lobe absent, basal lobe shortly quadrate, densely covered with stiff setæ with tubercular bases. Clasp-filament long and slender, slightly swollen medianly, with a long articulated terminal spine. Harpes slender, rather long, margins narrowly revolute, apex tapering to a small point which is bent sharply over. Harpagones with a stout long cylindrical base, curved in an arc, with a terminal articulated filament, long, ligulate, the tip slightly tapered, reaching to outer fourth of side piece. Unci membranous, indistinguishable. Basal appendages small, bearing four short stout setæ.

Larva, Stage IV (see figure of the entire larva, plate 75).—Head rounded, subquadrate, the sides straight, a notch at insertion of antennæ, front margin broadly arcuate. Antennæ cylindrical, slender, smooth, a single long hair near middle; three unequal spines and a digit on a pedicel at tip. Eyes small, round, with a central hair. Both pairs of dorsal head-hairs single; ante-antennal tuft four-haired. Mental plate triangular, with a central tooth and ten teeth on each side, the basal ones smaller and more remote. Mandible quadrangular, a few small spines at base; two filaments near tip, an outer row of cilia from a collar; fourteen filaments on outer edge, the outer ones more scattered; dentition of four teeth on a process, the first the largest; a tooth before, two small ones and a setose projection at base, a flat serrate filament and four slender ones within; process below cleft-furcate, hairy at tip and with a row of hairs down the middle; basal angle large, four filaments within; a row of coarse hairs at base. Maxilla irregularly spherical, divided by a suture, outer half lunate, much smaller than inner; hairs of inner half erect, a group of obtuse processes in middle of inner side, the long hairs near tip directed inwardly; outer half with a row of hairs; two filaments at suture; palpus nearly four times as long as wide, smooth, with four digits, of which two are small and one of them subapical. Thorax rounded, wider than long, anterior margin nearly straight. Hairs abundant, except on prothorax which is weakly and shortly haired. Abdomen long, posterior segments more elongate, submoniliform; hairs short, the lateral tufts two-haired from first to fifth segments, single on sixth; secondary hairs well developed, but not long. Tracheal tubes rather broad, band-shaped, slightly expanded in each segment, narrowed and tubular in seventh segment, expanded in thorax. Air-tube stout, conically tapered outwardly, two and a half times as long as wide; pecten occupying less than basal third, the teeth evenly spaced; single tooth a long tapered spine with short broad base from which arise two small spines; a three-haired tuft before middle of tube, well beyond pecten. Lateral comb of eighth segment of few scales in a small patch,

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scarcely three rows deep; single scales with triangular base, the body thick and broadly rounded, spined nearly evenly all round, about seven subequal spines on the broad tip. Anal segment widened outwardly, as broad as long; dorsal plate reaching halfway down the sides, removed from posterior edge; dorsal tuft a long brush of five hairs on each side, a single lateral hair at posterior angle of plate; ventral brush very small, of a few long hairs. Anal gills very large, four or more times as long as the segment, inflated, the ends rounded, with distinct central branched tracheæ and small white superficial spots.

The larvæ live in holes in trees containing water, but are found also in artificial receptacles under suitable conditions. Dr. Dyar first found them in an old tin in a shanty. Dr. Blaisdell found them in a hole in a sycamore tree and Dr. Dyar later met with them abundantly in holes in live oaks. Dr. Blaisdell says: "For the last three years they have been abundant, from July to January, when there was sufficient rain to keep water in the hole." The eggs are of the usual fusiform shape, black and granular, laid separately in irregular groups upon the sides of the cavity. They hatch upon the advent of water, and there are apparently several broods during the summer. The winter is probably passed in the egg state. The larvæ are slow in their motions and rather sluggish, remaining long below the surface of the water, which they are enabled to do on account of remarkably developed anal gills. The adult females bite readily in the daytime. Dr. Dyar says:

"The males are attracted to the person as well as the females. While they can not bite, they occasionally alight, and several were so taken, supposed at first to be females about to bite. While sitting in the woods near Victoria, British Columbia, the writer observed a small swarm of males which gathered before him and continued to dance, one occasionally alighting for an instant, as long as he remained there. During this time two females came to bite and each was immediately seized by a male, the pair flying off in a downward direction in copulation, which lasted apparently but a few seconds."

Extreme western portion of the United States and Canada.

Kaslo, British Columbia, June, 1903 (H. G. Dyar); Vancouver, British Columbia, August 6, 1906 (H. G. Dyar); Nanaimo, British Columbia, August 6, 1906 (Dyar and Caudell); Wellington, British Columbia, August 8, 1906 (Dyar and Caudell); Victoria, British Columbia, August 12, 1906 (H. G. Dyar); Seattle, Washington, July 31, 1906 (Dyar and Caudell); Ashford, Oregon, August 4, 1906 (Dyar and Caudell); Kent, Washington, June 20, 1907 (H. E. Burke); Portland, Oregon (R. P. Currie); Dunsmuir, California, July 19, 1906 (A. N. Caudell); Fieldbrook, California, May 26, 1903 (H. S. Barber); Bair's Ranch, Humboldt County, California, June, 1903 (H. S. Barber); Eureka, California, June 3, 1903 (H. S. Barber); Stanford University, California, July 7, 1903 (I. McCracken); Stockton, California (H. J. Quayle); San Raphael, California, July 14, 1904 (E. H. Ashman); Pasadena, California, May 11, 1906 (H. G. Dyar); Claremont, California (C. F. Baker); Williams, Arizona, July 29 (H. S. Barber); Glenbrook, Nevada, August 25, 1915 (H. G. Dyar).

Aëdes varipalpus shows considerable variation in the ornamentation of the imago. The thoracic pattern varies in extent, definition and somewhat in coloration. The white median dorsal spots of the abdominal segments may be nearly obsolete or may be expanded and joined to the lateral spots, thus producing basal bands.

AËDES CANADENSIS (Theobald) Dyar & Knab.

Culex canadensis Theobald, Mon. Culic., ii, 3, 1901.
Culex canadensis Giles, Gnats or Mosq., 2 ed., 422, 1902.
Culex canadensis Dyar, Science, n. s., xvi, 672, 1902.

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Culex canadensis Dyar, Journ. N. Y. Ent. Soc., x, 194, 1902.
Culex canadensis Smith, Ent. News, xiii, 267, 300, pl. xv, f. 2, 1902.
Culex canadensis Johannsen, Bull. 68, N. Y. State Mus., 416, 1903.
Culex canadensis Dyar, Proc. Ent. Soc. Wash., v, 141, pl. ii, f. 16, 1903.
Culex canadensis Smith, Bull. 171, N. J. Agr. Exp. Stat., 27, 1904.
Culex canadensis Dyar, Proc. Ent. Soc. Wash., vi, 38, 1904.
Culex canadensis Felt, Bull. 79, N. Y. State Mus., 303, 1904.
Culicada canadensis Felt, Bull. 79, N. Y. State Mus., 391b, 1904.
Culex nivitarsis Coquillett, Proc. Ent. Soc. Wash., vi, 168, 1904.
Grabhamia canadensis Dyar, Proc. Ent. Soc. Wash., vii, 48, 1905.
Culex niveitarsis Smith & Grossbeck, Psyche, xii, 14, 1905.
Culex niveitarsis Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 227, 1905.
Culex canadensis Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 265, 1905.
Culicada canadensis Felt, Bull. 97, N. Y. State Mus., 474, 1905.
Culex canadensis Blanchard, Les Moustiques, 316, 1905.
Culex canadensis Britton & Viereck, Rept. Conn. Agr. Exp. Stat. 1904, 269, 272, 273, 1905.
Culicada (*Culex*) *canadensis* Weber, Ent. News, xvii, 279, 381, 1906.
Aëdes canadensis Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 200, 1906.
Aëdes nivitarsis Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 200, 1906.
Ochlerotatus canadensis Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 20, 1906.
Ochlerotatus nivitarsis Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 20, 1906.
Ochlerotatus canadensis and *nivitarsis* Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 5, 1906.
Culex niveitarsis Theobald, Mon. Culic., iv, 408, 1907.
Culicada canadensis Theobald, Mon. Culic., iv, 341, 1907.
Culex canadensis Howard, Osler's Modern Medicine, i, 376, 1907.
Aëdes canadensis Knab, Smiths. Misc. Colls., quart. iss., i, 547, 1908.
Culex (*Ochlerotatus*) *canadensis* Viereck, 1st Ann. Rept. Comm. Health Pa., 470, 1908.
Aëdes canadensis Thibault, Proc. Ent. Soc. Wash., xii, 19, 1910.
Culicada (*?*) *canadensis* Theobald, Mon. Culic., v, 302, 1910.
Culex niveitarsis Theobald, Mon. Culic., v, 355, 1910.
Culex canadensis Theobald, Mon. Culic., v, 351, 1910.
Aëdes niveitarsis Morse, Ann. Rept. N. J. State Mus., 1909, 718, 1910.
Aëdes canadensis Morse, Ann. Rept. N. J. State Mus., 1909, 719, 1910.

ORIGINAL DESCRIPTION OF CULEX CANADENSIS:

Thorax deep chestnut-brown, with curved golden-brown scales, paler and broader ones at the sides. Abdomen dusky black, with basal white lateral patches, which show on the dorsum of the fourth to seventh segments. Fore and mid ungues of the ♀ equal and serrated, the hind equal, simple and nearly straight.

♀. Head dark brown, covered with pale golden curved scales, with a few black and ochraceous upright forked ones, and a border of pale scales round the eyes, black bristles projecting forwards, and a tuft of pale golden ones between the eyes; antennæ black with narrow pale bands and pale pubescence; basal joint and basal half of the second testaceous; proboscis, palpi and clypeus very dark brown.

Thorax brown to deep dull purplish-brown under the lens, deep chestnut-brown to the naked eye, covered with curved golden-brown scales on the dorsum of the mesonotum and with rather broader and paler ones at the sides; scutellum deep purplish-brown, with pale narrow curved scales and a single row of golden-brown bristles to the mid lobe of the scutellum; metanotum chestnut-brown; pleurae purplish-brown, with several patches of white scales.

Abdomen covered with dusky black scales, each segment with short pale golden posterior bristles, the segments with basal white lateral patches, which show on the dorsum of the fourth to seventh segments; venter entirely covered with pale ochraceous scales.

Legs with the coxae pale ochraceous, also the bases and under-sides of the femora, which are blackish towards the apical end, extreme apex pure white; tibiæ black scaled above, ochraceous below; the mid and hind pair have the apex with yellow and white scales forming a small spot; fore metatarsus and tarsi uniformly dark bronze colour; mid metatarsus with a pale dusky yellow band at the base and apex, first joint of mid tarsus with a narrow basal dusky yellow band, remainder dark bronzy brown; hind metatarsi not nearly as long as the tibiae, pale banded at each end, first and second tarsal joints pale at each end, the third all dark, the fourth pale dusky white; fore and mid claws equal, with a single tooth to each, hind ones nearly straight and simple.

Wings with the veins brown scaled, the lateral scales being rather thin and long; first sub-marginal cell a little longer and considerably narrower than the second posterior cell, its stem about two-thirds the length of the cell and equal in length

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to the stem of the second posterior cell; posterior cross-vein about its own length distant from the mid cross-vein.

Halteres with almost a white stem and a deep black knob.

Length.—6 to 6.5 mm.

♂. Head black, with black upright forked scales behind and a few ochraceous ones in front and pale golden curved scales; on the sides are pure-white flat scales; antennæ banded brown and white with chestnut-brown plumes; proboscis deep dull purplish-black; palpi deep brown basally, black towards the apex, the last joint but one with a basal band of white scales, hair-tufts dark brown.

Thorax deep brown, denuded; scutellum deep brown, median lobe with a single row of bristles; pleurae deep chestnut-brown, with patches of white scales.

Abdomen steely-black, with dusky brownish-black scales, the last few segments with basal white lateral patches; basal lobes of male genitalia black scaled and hairy.

Wings with the first sub-marginal cell a little longer and considerably narrower than the second posterior cell, its base a little nearer the apex of the wing than that of the second posterior, its stem not quite as long as the cell; stem of the second posterior cell equal in length to its cell; posterior cross-vein distant about twice its own length from the mid cross-vein.

Length.—5 mm.

Habitat.—De Grassi Point, Lake Simcoe, Ontario (E. M. Walker) (66).

Time of capture.—June and July.

Observations.—A very distinct species, in which the legs are very characteristically marked, the last tarsal joint of the hind legs being entirely dull white and the banding of the legs involving both sides of the joints. The dusky scaled abdomen, with the creamy-white basal lateral patches, is also very characteristic. It can thus be easily separated from any other North American species. A single male only was received, but a good series of ♀'s. The specimens were taken in such localities as the following: "From a low wood of arbor vitæ, spruce, balsam, fir, &c."; "common in rich woods and swamps"; also from dry and low woods and grass; grass and low herbs in a wood of aspen, maple, balsam, &c., according to the notes sent by the collector.

ORIGINAL DESCRIPTION OF CULEX NIVITARSIS:

♀.—Black, the thorax and scutellum brown, the first antennal joint, halteres, coxæ, femora, and tibiæ yellow, the hind tarsi white and with a faint median brownish band on the three middle joints. Scales of palpi brown, those on the basal portion yellow, on the apex white; scales of upper part of occiput golden yellow, on the sides and lower part chiefly white, those on the mesonotum golden yellow, on the abdomen purple, those on the extreme bases and front angles of the segments yellowish, including all on the seventh and following segments, those on the venter white. Scales of legs brown and whitish, not forming bands or spots, those on the first two pairs of tarsi brown and with white ones on the narrow bases and broad apices of the first two joints as well as on the narrow bases of the remaining joints of the middle tarsi; scales of the hind tarsi almost wholly white; all tarsal claws toothed. Wings grayish hyaline, the scales brown, lateral scales of the veins narrow and almost linear, petiole of first submarginal cell about two-thirds as long as this cell, hind cross-vein about its own length from the small. Length 4 mm.

♂.—Palpi slender, black, a broad band in middle of first joint and bases of the following joints white, proboscis reaching almost to apex of penultimate joint of palpi. Front and middle tarsi with one of their claws bidentate and the other unidentate, hind tarsal claws also unidentate; some of the brown bands on the hind tarsi quite distinct, especially the one on the third joint. Petiole of the first submarginal cell almost as long as that cell. Length 4.5 mm. Otherwise as in the female.

Paterson, New Jersey, May 12. A specimen of each sex submitted by Dr. J. B. Smith, to whom they have been returned.

DESCRIPTION OF FEMALE, MALE, LARVA, AND EGG OF AËDES CANADENSIS:

Female.—Proboscis rather long, cylindrical, uniform, tip scarcely widened, labellæ conically tapered; vestiture black with a slight bluish luster; setæ very small, curved, black, those on the labellæ more prominently outstanding. Palpi short, stout, about one-fifth the length of the proboscis, the vestiture of bluish-black scales mixed with a few white ones and many rather short black setæ, the tips narrowly white scaled. Antennæ with the joints subequal, black, rugose, pilose, the second joint a little longer and pale at extreme base; tori subspherical, with a cup-shaped apical excavation, pale yellowish, with a group of

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small black setæ on inner side; hairs of whorls sparse, moderate, black. Clypeus shortly conical, prominent, nude. Occiput brown, clothed broadly with narrow, curved, pale yellowish scales on the vertex, broad flat white ones on the sides, some brownish ones intermixed subdorsally, many erect, very narrow forked scales dorsally, some black, some pale; setæ along margins of eyes coarse, black.

Prothoracic lobes elliptical, remote dorsally, clothed with scales like those on vertex of head and numerous pale bristles. Mesonotum ferruginous brown, dorsal lines slightly paler; vestiture of small, narrow curved scales, golden brown dorsally, pale golden along anterior and lateral margins and around antescutellar space; a narrow golden line each side on posterior half outside of antescutellar space; bristles moderate, black, numerous above roots of wings. Scutellum trilobate, brown, clothed with pale golden scales, each lobe with a group of about ten long brownish bristles. Postnotum elliptical, prominent, brownish luteous, nude. Pleuræ and coxæ luteous, clothed with flat white scales and short pale bristles.

Abdomen subcylindrical, flattened, posterior segments tapering; dorsal vestiture of black scales with a slight greenish or coppery reflection, a narrow band of white scales at base of each segment widening laterally, medianly interrupted on sixth and seventh segments; first segment with a patch of black scales in the middle, a few white ones on each side, and with many fine pale hairs; venter entirely whitish scaled except for triangular black patches on posterior lateral margins; cerci black; setæ fine, moderately abundant.

Wings rather broad, hyaline with an iridescent luster; petiole of second marginal cell about two-thirds as long as its cell, that of second posterior cell about as long as its cell; posterior cross-vein about its own length distant from anterior cross-vein; vestiture of veins entirely black, the outstanding scales on apical portion of wing dense, narrowly ligulate. Halteres whitish, with a slightly darker knob.

Legs moderately long and slender; femora largely pale beneath, a few black scales above which become numerous at apex, tips white; tibiæ pale on sides, clothed with black scales along outer edge; tarsi black, each joint of hind tarsi with a broad basal and apical white ring, the last joint wholly white; bands on mid tarsi much reduced, on fore tarsi present only on first and base of second joint, the last three joints entirely black. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis straight. Palpi exceeding the proboscis by half the length of last joint, last two joints slightly enlarged; vestiture brownish black, a broad white ring at middle of long joint and a small one at bases of last two joints; end of long joint and last two joints with numerous long dull brown hairs. Antennæ plumose, the last two joints long and setose, the others short, the thickened rings at insertions of hair-whorls black, the rest pale; hairs of whorls long, dense, brown. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells longer, both considerably longer than their cells, the vestiture sparse. Abdomen elongate, depressed, the basal white bands very broad and laterally expanded; lateral ciliation long, dense, pale yellowish. Claw formula, 2.1–2.1–1.1.

Length: Body about 5 mm.; wing 4 mm.

Genitalia (plate 28, fig. 193): Side-pieces two and one-half times longer than broad, apical and basal lobes similar, quadrate, prominent, flattened, with dense short setæ. Clasp-filament long and slender, slightly swollen medianly, with a long articulated terminal spine. Harpes flat, concave, inner margin revolute, tip bent sideways, with a short spine. Harpagones with a slender columnar stem bearing a small seta before the tip and a slender linear filament at the apex which is nearly as long as the stem. Unci membranous, obscure, forming a small

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basal truncated cone. Basal appendages small, approximated, bearing four small setæ at tip.

Larva, Stage IV (see figure of entire larva, plate 61).—Head broad, narrowed before eyes but nearly straight, a slight notch at insertion of antennæ, front margin broadly arcuate. Antennæ rather long, slender, subcylindrical, tapering a little distally, well spined all over; a large tuft before middle; four spines of irregular lengths at tip and one small digit. Eyes large, transverse. Both pairs of dorsal head-hairs and anteantennal tufts multiple. Mental plate triangular, the central tooth scarcely longer than the others, eleven side teeth, becoming more remote and larger toward the base except the last, which is small. Mandible quadrangular, elongate, rounded without, with a group of blunt spinules toward base; two filaments near tip; an outer row of stout cilia; eight filaments and two plumose hairs on outer edge; dentition of three teeth on a prominence and a fourth rudimentary; a long filament before, an appressed tooth at base, a broad filament and five fringed ones within; process below furcate, with groups of hairs; basal prominence large, rounded, with five filamentous hairs within; ten large hairs at base. Maxilla elongate, hemispherical, divided by a band-shaped suture; inner half hairy on margin and near the suture; a crown and short band of hairs at tip; outer half haired toward base, two filaments near the suture and a spine near tip; palpus with wide base and four minute digits at tip. Thorax rounded, wider than long; hairs abundant, not long, the subdorsal prothoracic hairs single. Abdomen rather stout, anterior segments shorter; hairs moderate, the laterals of first segment multiple, double on second to fifth segments, single on sixth; secondary hairs few, but subdorsal tufts on fourth and fifth segments rather long. Tracheal tubes broad, band-shaped, slightly expanded in the segments, narrower posteriorly. Air-tube stout, tapered, thickest beyond base, three times as long as wide; pecten reaching nearly to middle, the teeth evenly spaced; single tooth a long spine with wide base, simple or with two to four branches. Lateral comb of eighth segment of many scales in a triangular patch; single scale elongate with pointed base, fringed with spines of which the apical ones are longest. Anal segment longer than wide; dorsal plate large, reaching two-thirds way down the sides, straight on lateral margin; dorsal tuft a brush and hair on either side; a single lateral hair; ventral brush well developed, with short tufts preceding barred area toward base. Anal gills moderate, ensiform, about as long as the segment.

Egg (plate 146, fig. 682).—Subfusiform, slightly flattened on one side, micropylar end roundedly flattened, with a central truncated prominence; sculpture roughly quadrangular, the rows somewhat spiral.

The larvæ live in temporary ground-pools of all sorts. The eggs lie on the ground over winter, and many hatch with the melting snow, making an early spring brood. Many of the eggs, however, still remain, and in favorable locations some of them hatch with each rain, producing successive broods of adults. Probably in the main there is but a single generation in the year, although this is mostly inferential, as the point has not been proved. The species is one of the commonest in the northern woods, and the adults are in evidence until later in the season than the other early spring species. It becomes less prominent in the south. In Virginia we have met with the larvæ in cold springs; it is not usually found in the ordinary ground-pools, as these are apparently too warm. Prof. J. B. Smith of New Jersey has published the following observations:

"This is the earliest and latest of the species that winter in the egg stage: earliest as to both adult and larva, and latest as to larva only. The extreme records for either direction are from Mr. J. Turner Brakeley, who found recently hatched larvæ in November and again in the February following. That

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the February larvæ did not hibernate as such is abundantly proved by the almost daily collections made during February, 1903, by the fact that larvæ developed in water with a portion of the mud bottom from woodland pools and, finally, by the fact that I found the eggs in some samples of mud from the bottom of breeding pools sent in to me for examination at my request.

"The first find was made February 6th in a jar in which larvæ of *C. melanurus* were being bred. These larvæ were collected February 3d, and at that time no trace of small wrigglers was noted. One example found on the 6th seemed as if it had just hatched, and there is no reasonable doubt that the transfer from the breeding pools to the house temperature induced development. Collections were made in the field February 8th in a sleet storm, the pools ice covered and the water temperature 36 degrees. Twenty-five specimens, all of them apparently just out of the egg, were collected, and these mostly out of the bottom mud where they seemed to be in hiding. To test this yet further, a supply of bottom material was secured February 9th, and in less than twenty-four hours minute larvæ were found in each of the breeding jars into which it was placed. It is positively proved, therefore, that during the early days of February, in water just above the freezing temperature, the larvæ of *canadensis* may and do hatch from the egg under entirely natural conditions. Hatching may be hastened by disturbing the material in which the eggs are laid, and this probably accounts for the larvæ first found in the jars.

"February, 1903, was a cold month and the breeding pools in which the larvæ were found became iced over several times, so as to bar absolutely all access to the surface; nevertheless, there was no apparent decrease in the number of specimens, but, on the contrary, a continuous increase. Artificial tests were made February 18th and 19th, when the bottles with baby larvæ were allowed to freeze almost solid. Nevertheless they survived the test and specimens could be watched partly imbedded in ice, wriggling to free themselves until the surrounding temperature rose sufficiently to release the ice grip. In nature the larvæ usually manage to escape actual freezing by getting into the bottom mud, and that was illustrated by an examination made March 2d, after a night when the thermometer registered 23 degrees. The pool was completely ice-covered, a hole was chopped near the edge with an ax, and through this hole larvæ were dipped up in fair numbers with the bottom material. No larvæ were imbedded in the ice.

"Development at this season is slow and the new hatchings during early March rapidly overhauled those that appeared earlier, so that by the middle of that month the great bulk of the brood was about half grown or a little larger. The pupal period ranges from two to seven days, according to temperature.

"The earliest record for adults taken outdoors is April 14th and is also from Mr. Brakeley. It is not until the early days of May, however, that both sexes are at all abundant, and at that time not all of the hibernated eggs are yet hatched. There is a false appearance of a second brood coming immediately after the first adults are on the wing; but it seems fairly certain that all the *canadensis* that are found until the middle of June are from hibernating eggs. After that time the species decreases in number, though it has been taken in all stages throughout the summer. What seems to be the second brood begins to hatch during the early days of June, and thereafter I have not been able to identify any definite period when young were present in large numbers.

"Our records show larvæ, pupæ and adults at South Orange as early as April 27th, and at Garret Mountain, Paterson, April 29th. A month later, May 28th, South Orange again had recently hatched larvæ in considerable number. From the Paterson district larvæ were taken that matured early in September, and larvæ found in the Great Piece meadows in early September yielded *canadensis*

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up to the 21st of that month. Perhaps the greatest abundance of *canadensis* is in late May, and thereafter a constant decrease. It occurs throughout the State.

"Breeding places are any sort of woodland pools or even larger water bodies. Mr. Brakeley finds them in the water covering his cranberry bogs during the winter, sometimes in very large numbers. These bogs are covered with water late in fall and are kept covered until the middle of May thereafter, just long enough to mature *canadensis*. From that time until late October the bogs are dry, and when they are flooded *canadensis* adults have disappeared. The eggs must, therefore, have been laid on the bogs when they were dry, to account for the swarms of larvæ found in early May. It should be noted that these bogs are closely surrounded by woodland.

"I have never found the larva in open swamps or in pools far from the edge of a wood, but it was present once in a pool with *cantator* at the edge of the Shrewsbury meadow.

"Though the larvæ may be found in all sorts of pools, they are commonly of clean water. Woodland springs nearly always have some of them, and the pools in which they are most plentiful are those formed by melted snows and early spring rains over a bed of dead leaves in a depression or choked stream bed near the edge of the woodland, or in a small clearing. I have never found them in really foul water."

We can add to the observations of Prof. Smith that we have repeatedly found the larvæ in temporary pools in open meadows or pastures, early in the spring, in New England. In the southern part of its range the species is less common and larval development depends upon the formation of temporary pools by heavy rains.

North America, east of the Plains; westward in Canada to the Rocky Mountains.

Kaslo, British Columbia, June 3, 1903 (H. G. Dyar); Oxbow, Saskatchewan, June 13, 1906 (F. Knab); Bigfork, Montana, August 20 (Edith Ricker); White River, Ontario, June 25, 1907 (F. Knab); Ottawa, Ontario, May 8 (J. Fletcher); Younghall, New Brunswick, July 2, 1908 (A. Gibson); St. John, New Brunswick, August 10, 1900 (W. McIntosh); Center Harbor, New Hampshire, May 16, 1902 (H. G. Dyar); White Mountains, New Hampshire (H. K. Morrison); Dublin, New Hampshire, May, June, 1909 (A. Busck); Caribou, Maine, August 17, 1906 (E. M. Patch); Lincolnville, Maine, August, 1908 (H. G. Dyar); Ithaca, New York, May 4, 1903 (O. A. Johannsen); Springfield, Massachusetts, May 15, September 1, 1903 (F. Knab); Westfield, Massachusetts, July 30, August 23, 1903 (F. Knab); Cummington, Massachusetts, May 30, 1903 (F. Knab); Tupper Lake, New York, September 7, 1906 (H. G. Dyar); Suffield, Connecticut, May 20, 1903 (F. Knab); Shenks Ferry, Pennsylvania, October 14, 1901 (S. E. Weber); Bladensburg, Maryland, June 17, 1903 (F. C. Pratt); Lloyds, Maryland, July 10, 1907 (H. S. Barber); Plummer's Island, Maryland, May 20, 1903 (W. V. Warner); Woodstock, Virginia, June 2, 1903 (F. C. Pratt); Glen Carlyn, Virginia (H. G. Dyar); Mount Vernon, Virginia, April 29, 1903 (W. V. Warner); Richmond, Virginia, September 26, 1901 (E. G. Williams); Hartsville, South Carolina, June 25, 1901 (W. C. Coker); Corbin, Kentucky, August 24, 1903 (H. S. Barber); Scott, Lonoke County, Arkansas, April 28, 1909 (J. K. Thibault, jr.); Magnolia Springs, Florida, March 3, 1905 (Dyar and Caudell); Jacksonville, Florida, March 2, 1905 (Dyar and Caudell); Green Cove Springs, Florida, March 4, 1905 (A. N. Caudell); Orange City Junction, Florida, March 20, 1905 (Dyar and Caudell).

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Coquillett described *Culex nivitarsis* from two specimens and none have been since collected. Dr. C. S. Ludlow suggested to us that these specimens were only aberrations of *A. canadensis*, and we have adopted this view. We have examined the types (one male and one female in the collection of Dr. John B. Smith) and find the markings of the legs dissimilar on the two sides. The larvæ of the two forms are indistinguishable. The following is a detailed description of *nivitarsis*, drawn up from the type specimens.

Female.—Proboscis rather long, cylindrical, uniform, tip scarcely widened, labellæ conically tapered; vestiture black; setæ very small, curved. Palpi short, stout, about one-fifth the length of the proboscis; vestiture of bluish-black scales, the apices white-scaled and with rather short black setæ. Antennæ with joints subequal, black, rugose, pilose, the second joint a little longer and pale at extreme base; tori subspherical, with a cup-shaped apical excavation, deep yellowish, with a patch of small black setæ on inner side; hairs of whorls sparse, moderate, black. Clypeus shortly conical, prominent, nude, blackish. Occiput brown, densely clothed with narrow curved scales on vertex, flat ones on sides; scales pale yellow dorsally, white on the sides, some blackish ones intermixed subdorsally; margin of eyes silvery-white scaled; many erect, forked, pale scales on the nape; setæ along margins of eyes coarse, black.

Prothoracic lobes elliptical, remote dorsally, clothed with scales colored like those on vertex of head, and with numerous pale bristles. Mesonotum brown, vestiture of small, narrow, curved scales, golden brown dorsally, pale golden along anterior and lateral margins and around antescutellar space; bristles moderate, black, numerous above roots of wings. Scutellum trilobate, gray, clothed with pale-golden scales, each lobe with a group of brownish bristles. Postnotum elliptical, prominent, brownish luteous, nude. Pleuræ and coxæ luteous, clothed with flat white scales and short pale bristles.

Abdomen subcylindrical, flattened, posteriorly tapering; dorsal vestiture of black scales with a slight greenish or coppery reflection, a narrow band of dull-white scales widening laterally at base of each segment; first segment with a patch of black scales in the middle, a few white ones on each side, and with many fine pale hairs; venter entirely whitish scaled except for triangular black patches on posterior lateral margins of posterior segments; the white of venter and lateral spots has a silvery sheen; cerci black; setæ fine, moderately abundant.

Wings rather broad, hyaline, faintly smoky; petiole of second marginal cell about two-thirds as long as its cell, that of second posterior cell shorter than its cell; posterior cross-vein distant about its own length from anterior cross-vein; vestiture of veins entirely black, outstanding scales on apical portion of wing dense, narrowly ligulate. Halteres whitish, with a slightly darker knob.

Legs rather slender; femora largely pale beneath, above a few black scales with silvery sheen; tibiæ largely white, clothed with black scales along outer edge; tarsi all covered with a silvery sheen that renders the markings obscure, irregularly marked, as follows: right and left fore tarsi practically alike, the first and second joints black with white rings at base and apex of each, third joint narrowly white at base, the last two joints black with a slight whitish sheen at incisures; on right mid tarsus the first joint is all white, the second with a black ring towards base, the third narrowly white at base, the fourth and fifth black; the left mid tarsus has the first joint with a black ring at middle, the second and third black with white rings at base and apex, the fourth and fifth joints white; hind right tarsus white, the second, third, and fourth joints with black median rings, the ring of second joint faint; the left hind tarsus is broken, only the first joint remaining. Claw formula, 1.1–1.1–1.1.

Length: Body about 5 mm.; wing 4.5 mm.

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Male.—Palpi exceeding the proboscis by nearly the length of the last joint, last two joints slightly enlarged; vestiture brownish-black, a broad white ring at middle of long joint and small spots at bases of last two; end of long joint, and the last two joints with long black hairs. Antennæ plumose, the last two joints long and setose, the others short, the thickened rings at insertions of hair-whorls black, the rest pale; hairs long and black. Coloration similar to the female. Abdomen densely hairy laterally, the basal white bands very broad. Right and left fore tarsi alike, black with narrow white rings at base and apex of first joint and base of second; right mid tarsus black with white rings at base and apex of first and second joints; left mid tarsus without white ring at apex of second joint; right hind tarsus white, a black band in the middle of second and third joints, the last two missing; left hind tarsus with a black spot on second joint, the last three missing. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture sparse.

Aëdes canadensis is a widely distributed species in North America, but apparently has no European representative.

AËDES NIGROMACULIS (Ludlow).

Grabhamia nigromaculis Ludlow, Geo. Washington Univ. Bull., v, 85, 1907.
Grabhamia grisea Ludlow, Can. Ent., xxxix, 130, 1907.
Grabhamia sollicitans Theobald (in part, not Walker), Mon. Culic., iv, 291, 1907.
Grabhamia grisea Theobald, Mon. Culic., v, 287, 1910.
Grabhamia nigromaculis Theobald, Mon. Culic., v, 289, 1910.

ORIGINAL DESCRIPTION OF GRABHAMIA NIGROMACULIS:

♀. Head very dark brown, almost black, covered with ochraceous broad curved scales on the vertex and occiput, a triangular spot of slender golden brown curved scales immediately laterad, followed by flat, white, then brown, lateral scales and light scales towards the ventral surface; white bristles and very slender, long scales projecting forward between the eyes, a heavy bunch of pale forked scales in the nape; antennae dark brown, verticels very dark brown and sparse, pubescence white, basal joint very dark brown with flat scales; palpi very dark brown; proboscis very dark brown with a tiny white spot (sometimes an indistinct white band) on the apical part of the proximal third of its length, a few white scales at the base, apex dark; eyes dark blue, red iridescence; clypeus very dark.

Thorax almost black; prothoracic lobes covered with long rather slender spatulate white scales and light bristles; mesothorax with a median third of slender curved golden brown scales, pale on the curved half, and the outer thirds with rather broader pale ochraceous scales; a bunch of pale bristles over the wing joint and a few dark ones near the "bare space;" scutellum very dark (black) with pale ochraceous slender curved scales and pale bristles; pleura very dark brown with white spindle shaped and long flat scales, and pale bristles; metanotum very dark brown.

Abdomen very dark, covered with very dark brown, practically black, and pale ochraceous scales, i. e., pale basal and very narrow apical bands, a median ochraceous stripe on most of the segments, white lateral spots and a few pale scales scattered in the dark submedian spots; the dark spots on the apical segments are much reduced so that these segments are mostly pale scaled. Venter mostly pale scaled.

Legs: Coxæ and trochanters dark, covered mostly with white scales, a few very dark ones and some dark bristles; femora ventrally light, dorsally speckled nearly evenly black and white, light towards the base, and almost black just proximal to the tiny apical light spot which very slightly includes both sides of the joint; tibiae much as femora, more distinctly dark towards the apex; metatarsi speckled, darker than the tibiae, and having a basal white band, very narrow in the fore leg; all the tarsal joints are dark and in the fore and mid legs the first and second tarsal joints have tiny basal white spots; in the hind legs all the tarsal joints are basally white banded, the band on the fourth joint very narrow. Ungues large and equal, both uniserrate.

Wings clear with dark brown and white scales, speckled; the ventral scales all white. First, submarginal cell a little longer than, and about half the width of the second posterior cell; *mid* and supernumerary cross veins meet and are about equal,

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posterior cross vein about the same length as, and its own length distant from mid. Halteres with light stem and dark knob.

Length. 8-8.5 mm.

Habitat. Fort Keogh, Montana, Fort Lincoln, N. D.

Taken. Fort Keogh, Sept. 1–8., July 12–27.

ORIGINAL DESCRIPTION OF GRABHAMIA GRISEA:

(Female.) Head dark, covered with slender curved scales, light ochraceous on the occiput, a triangular space of darker golden brown, scales just external, and ochraceous flat scales on the sides, no fork scales; antennae brown, verticels brown, pubescence light, basal joint brown, covered with flat ochraceous scales; palpi entirely brown scaled; proboscis brown, a light band, narrow on the dorsal and wider on the ventral aspect, at the apex of the proximal half; clypeus brown; eyes brown and gold.

Thorax dark brown, prothoracic lobes with slender curved light brown scales; mesonotum with slender curved scales, a distinct bare (dark) median line, immediately laterad of which on either side is a broad stripe of bright brown scales, then a light golden brown or ochraceous stripe extending cephalad from the scutellum to nape, external to these on the caudad half are the darker brown scales, and the lateral portion of the dorsum is covered with the lighter brown scales; scutellum dark, with light brown or ochraceous scales, and long light bristles on the margin; pleura ashy-brown, with white scales; metanotum dark brown.

Abdomen dark, heavily and closely covered by flat ochraceous scales; two tiny dark submedian points not large enough to call spots, and yet very distinct, on all the segments but the first, which has a large bunch of almost white scales and light hairs; ventrally the abdomen is also covered with ochraceous scales, but not so heavily as dorsally.

Legs: coxae and trochanters mostly light-scaled; femora dorsally sprinkled with dark brown and ochraceous scales, darker toward the apex, but the very apex white; ventrad, caudad and cephalad aspects ochraceous. Tibiae much like femora but darker, and on the hind legs have a distinct dark apical band; metatarsi on fore legs much like tibiae, and all the following joints missing; on mid legs also much like tibiae; tarsal joints dark, the first and second with small ochraceous basal spots; on the hind legs the metatarsi are quite dark but still slightly sprinkled with light scales, and it and all the tarsal joints except the fourth are heavily basally white-banded, the fourth dark; all ungues uniserrate.

Wings clear, mostly dark-scaled, especially near the costa, the sixth long vein mostly dark, first submarginal a little longer and about half the width of the second posterior cell, the stems in each case about two-thirds the length of the cell; cross-veins nearly equal in length, the posterior about its own length distant from the mid; halteres mostly light, a little darkened on the knobs.

Length, 5-6 mm.

Habitat, Boise Barracks, Idaho. Taken July.

This evidently lies near *G. Fletcherii*, but the abdominal marking is distinct, and the specimens of *Fletcherii* which I have seen do not show a marked band on the hind metatarsi, nor a white band on the proboscis.

DESCRIPTION OF FEMALE AND MALE OF AËDES NIGROMACULIS (LARVA UNKNOWN):

Female.—Proboscis moderate, cylindrical, uniform, labellæ conically tapered; vestiture black, with a narrow white ring at middle; tips of the labellæ whitish, their setæ minute, somewhat outstanding. Palpi short, stout, about one-fourth as long as the proboscis, deep black, tips slightly whitish. Antennæ moderate, distal joints longer than basal ones, rugose, shining blackish, white pilose, the proximal joints dull yellowish; tori subspherical, with a cup-shaped apical excavation, blackish, with many broad, flat whitish scales; hairs of the whorls sparse, very short, black. Clypeus prominent, broadly conical, dull black, slightly pruinose. Eyes black. Occiput black, broadly clothed with coarse, very narrow curved scales on the vertex, flat ones on lower parts of sides; scales yellowish white, a large brownish patch in middle of side; many yellowish, erect forked scales well back on the nape; bristles rather numerous, brown, those projecting between eyes whitish.

Prothoracic lobes elliptical, remote, black, with curved yellowish-white scales, brown ones above, and blackish setæ. Mesonotum black, clothed with narrow, curved scales, pale brownish golden, a rather broad, deep golden brown median

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stripe, on posterior half a narrow stripe each side of antescutellar space, humeral angles broadly deep golden brown scaled, scales about antescutellar space paler. Scutellum trilobate, blackish, clothed with narrow curved pale yellow scales, each lobe with a group of rather fine pale bristles. Postnotum broadly elliptical, prominent, black, nude. Pleuræ and coxæ black, clothed with elliptical, flat, white scales, the setæ small and not abundant, mostly whitish.

Abdomen subcylindrical, tapering posteriorly, the last segment slender; dorsum clothed with dull black and sordid white scales, the white scales form a median stripe, a band at the base of each segment widening into lateral triangular patches, and a narrow apical band; upon the sides the white scales are nearly continuous, only a few of the black ones reaching through to the apical angles; first segment with a large patch of flat white scales and with many pale hairs; last segment almost wholly white; venter clothed with yellowish-white scales, a few black ones intermixed.

Wings rather broad, hyaline; petiole of second marginal cell slightly shorter than its cell, that of second posterior cell about equal to its cell; basal cross-vein distant less than its own length from anterior cross-vein; vestiture of black and white scales, costa white scaled on basal fourth, then black to tip; the subcostal and first veins have the black and white scales about evenly intermixed, the other veins are almost wholly black scaled, only a few white ones are visible on the base of the fourth vein; the outstanding scales on outer half of wing long and rather broadly linear; fringe blackish, unicolorous, appearing mottled black and whitish according to direction of light. Halteres with whitish stems and blackish knobs.

Legs moderate; femora with yellowish-white and black scales evenly intermixed, the black ones predominating just before tip, the apex narrowly white; tibiæ with black and white scales, the tips black; hind tarsi black, each joint with a broad basal pure white ring, the first with some white scales intermixed on basal half, forming a broad, diffused whitish mark, last joint black with white scales on basal half; front tarsi with last three joints unmarked; mid tarsi with last two unmarked. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4.5 mm.

Male.—Proboscis slender, straight, unicolorous. Palpi long, somewhat exceeding the proboscis; tip of long joint and last two joints somewhat thickened and clothed with long blackish hairs; vestiture of dark-brown scales, the last two joints with narrow white basal rings, the long joint with a white ring below middle. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, whitish, thickened at insertions of hair-whorls; hairs long, dense, brown. Coloration similar to the female. Abdomen elongate, depressed, sides with long, abundant, pale ciliation. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture sparse. Claw formula, 2.1–2.1–1.1.

Length: Body about 5.5 mm.; wing 4.5 mm.

Genitalia (plate 32, fig. 213): Side-pieces three times as long as wide, slender, uniform, rounded at tips; basal lobe small, rounded, prominent, setose. Clasp-filament slender, uniform, with a long terminal spine. Harpes elliptical, concave, inner margin thickened, tip bent and pointed. Harpagones with a rather short slender straight stem, and slender filament, about as long as stem. Unci forming a cone, basally placed.

Life history and habits unknown.

Arid regions of west-central United States to Mexico.

Fort Keogh, Montana, September, 1906 (through C. S. Ludlow); Cascade, Montana, July 25, 1907 (W. E. Britton); Bigtimber, Montana, August 25, 1908 (R. A. Cooley); Fort McKinley, Wyoming (through C. S. Ludlow);

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Boise, Idaho, August 4, 1901 (C. B. Simpson); Boulder, Colorado, September 2, 1907 (S. A. Rohwer); Akron, Colorado, June 24, 1909 (H. L. Shantz); Las Vegas Hot Springs, New Mexico, August 7 (H. S. Barber); Cimarron, New Mexico, September, 1909 (C. N. Ainslie); Plano, Texas, November (E. S. Tucker); Hacienda Rio Piedras Verdes, altitude 7,300 feet, Sierra Madre, Chihuahua, Mexico (C. H. T. Townsend).

It seems not improbable that this species is an inhabitant of alkaline pools. Such places at least should be searched for the larvæ. The species is obviously allied to *sollicitans* and *mitchellæ*.

Aëdes nigromaculis shows considerable variation in its coloration. The ground-color of the mesonotum varies from brownish golden to sordid white, while the dark brown markings vary in extent and intensity. The abdominal coloration is similar to that of *spencerii* and *curriei* and varies in the same manner, typical specimens showing a pair of subquadrate black patches on each segment.

AËDES SOLLICITANS (Walker) Dyar & Knab.

Culex sollicitans Walker, Ins. Saund., 427, 1856.
Culex tæniorhynchus Coquillett (in part), U. S. Dept. Agr., Div. Ent., Circ. 40, 2d ser., 7, 1900.
Culex sollicitans Giles, Handb. Gnats or Mosq., 240, 1900.
Culex sollicitans Theobald, Mon. Culic., i, 368, 1901.
Culex sollicitans Howard, Mosq., 36, 1901.
Culex sollicitans Giles, Handb. Gnats or Mosq., 2 ed., 398, 1902.
Culex sollicitans Dyar, Journ. N. Y. Ent. Soc., x, 197, 1902.
Culex sollicitans Smith, Ent. News, xiii, 300, pl. xv, f. 4, 1902.
Culex sollicitans Smith, Proc. Ent. Soc. Wash., v, 52, 1902.
Culex sollicitans Smith, Spec. Bull. T, N. J. Agr. Exp. Stat., July, 1902.
Culex sollicitans Smith, Science, n. s., xvi, 391, 1902.
Culex sollicitans Dyar, Science, n. s., xvi, 672, 1902.
Culex sollicitans Dyar, Proc. Ent. Soc. Wash., v, 47, 1902.
Grabhamia sollicitans Theobald, Mon. Culic., iii, 247, 1903.
Culex sollicitans Johannsen, Bull. 68, N. Y. State Mus., 416, 1903.
Culex sollicitans Taylor, Rev. de Med. Trop., iv, 155, 1903.
Culex sollicitans Parker, Beyer & Pothier, Bull. 13, Yellow Fever Inst., U. S. Pub. Health and Mar. Hosp. Serv., 37, 1903.
Culex sollicitans Smith, Psyche, x, 1, 1903.
Culex sollicitans Dyar, Proc. Ent. Soc. Wash., v, 144, pl. ii, f. 15, 1903.
Culex sollicitans Smith, Rept. Ent. Dept., N. J. Agr. Exp. Sta., 1902, 515, 1903.
Culex sollicitans Smith, N. J. Agr. Exp. Stat., Bull. 171, 17, 1904.
Culex sollicitans Pazos, Bull. Soc. Ent. France, 1904, 134, 1904.
Culex sollicitans Felt, Bull. 79, N. Y. State Mus., 294, 1904.
Culicada sollicitans Felt, Bull. 79, N. Y. State Mus., 391*b*, 1904.
Culex sollicitans Dyar, Journ. N. Y. Ent. Soc., xii, 174, 1904.
Culex sollicitans Smith, N. J. Agr. Exp. Stat., Rept. Mosq., 198, 1905.
Culex sollicitans Blanchard, Les Moustiques, 295, 1905.
Grabhamia sollicitans Blanchard, Les Moustiques, 396, 1905.
Grabhamia sollicitans Dyar, Proc. Ent. Soc. Wash., vii, 48, 1905.
Culex sollicitans Britton & Viereck, Rept. Conn. Agr. Exp. Stat., 1904, 268, 272, 274, 1905.
Grabhamia sollicitans Herrick, Ent. News, xvi, 283, 1905.
Culex sollicitans Coffin, in Shattuck, The Bahama Ids., 287, 1905.
Culicada sollicitans Felt, Bull. 97, N. Y. State Mus., 477, 1905.
Grabhamia sollicitans Theobald, Mosq. or Culic. Jamaica, 32, 1905.
Aëdes sollicitans Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 190, 197, 1906.
Ochlerotatus sollicitans Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 19, 1906.
Ochlerotatus sollicitans Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 5, 1906.
Grabhamia sollicitans Theobald (in part), Mon. Culic., iv, 291, 1907.
Culex sollicitans Howard, Osler's Modern Medicine, i, 375, 1907.
Aëdes sollicitans Knab, Journ. N. Y. Ent. Soc., xv, 216, 1907.
Culex (Ochlerotatus) sollicitans Viereck, 1st Ann. Rept. Comm. Health Pa., 468, 470, 1908.
Aëdes sollicitans Pazos, San. y Ben., ii, 47, 319, 1909.

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Grabhamia sollicitans Theobald, Mon. Culic., v, 278, 1910.
Aëdes sollicitans Morse, Ann. Rept. N. J. State Mus., 1909, 717, 1910.
Culex sollicitans Felt, Bull. 136, N. Y. State Mus., 24, 1910.

ORIGINAL DESCRIPTION OF CULEX SOLLICITANS:

Fœm. *Nigra, cervino tomentosa; proboscis testacea, apice nigra; antennae basi testaceae; thorax nigro bivittatus; latera et pectus albida; abdomen maculis lateralibus nigris quadratis; pedes graciles, tarsis nigris albo cinctis; alae subcinereae, venis testaceis nigro hirtis; halteres testacei apice fusci.*

Black, with fawn-coloured tomentum. Proboscis long, slender, curved, testaceous, black towards the tip. Antennae black, testaceous at the base. Thorax with two black stripes; sides and pectus whitish. Abdomen with two lateral black quadrate spots on each segment; the two apical segments with narrower spots. Legs slender; tarsi black, with white bands. Wings grayish; veins testaceous, fringed with minute black hairs. Halteres testaceous, with brown knobs. Length of the body 3 lines; of the wings 5 lines.

United States.

DESCRIPTION OF FEMALE, MALE, LARVA, AND EGG OF AËDES SOLLICITANS:

Female.—Proboscis moderate, subcylindrical, uniform, labellæ conically tapered; vestiture black with a broad white ring somewhat beyond the middle; setæ minute, black, those on labellæ more prominently outstanding. Palpi moderately short, stout, over one-fourth as long as the proboscis; vestiture black, the extreme tips white; setæ moderate, rather long, black. Antennæ with the basal joints somewhat shorter than the distal ones, rugose, pilose, blackish with minute white tips; tori subspherical, with a cup-shaped apical excavation, pale yellowish, a small patch of white scales on inner side; hairs of whorls sparse, rather short, black. Clypeus prominent, conical, dark brown, nude. Eyes black. Occiput dark brown, densely clothed with coarse, narrow curved scales which are dark golden brown on the sides, brownish-yellow on the vertex, a number of short, erect, forked pale scales on the nape, cheeks clothed with broad, flat white scales, a small patch of dark ones well up the sides on ocular margin; bristles bordering eyes few, black, a dense tuft of pale ones projecting between the eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with golden-brown scales above, white ones below, and coarse black bristles. Mesonotum black, densely clothed with golden-brown scales; a pair of narrow, lighter, more yellowish longitudinal stripes, and the scales of this lighter color in the antescutellar region; broad stripes of deep brown scales on humeral angles; bristles rather short, blackish. Scutellum trilobate, gray, clothed with pale ochraceous scales, each lobe with a group of pale bristles. Postnotum shortly conical, prominent, brown with irregular black streaks, nude. Pleuræ and coxæ brown, clothed with elliptical, flat, pure white scales and rather numerous short bristles, which are pale on pleuræ but blackish on anterior coxæ.

Abdomen subcylindrical, posterior segments tapering; dorsal vestiture of flat black scales, a broad median stripe of pale yellowish grey ones, each segment with a broad transverse basal band of the same color and a very narrow apical one, along the sides a row of median segmentary pure white patches, larger posteriorly; first segment with a large patch of pale grey scales and with many fine pale hairs; venter clothed with black and white scales, the white predominating, the black forming a diffused median line. Cerci black.

Wings moderately broad, slightly infuscated; petiole of second marginal cell shorter than its cell, that of second posterior cell also shorter but less markedly so; basal cross-vein about its own length from anterior cross-vein; scales rather broad, black and white evenly intermixed, the black predominating, especially on costal edge; outstanding scales along second and third veins and along the ends of all the veins broadly linear, black; fringe unicolorous, dusky. Halteres entirely pale.

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Legs moderate; femora clothed with pale yellowish grey scales intermixed with a few black ones which predominate dorsally, a few pure white ones on under side, extreme tips white; tibiæ with pale yellowish grey and black scales intermixed, the pale ones predominating on inner side, a broad black apical ring and a very narrow white basal spot, the stout erect setæ dark brown; tarsi black, each joint of hind tarsi with a very broad, pure white basal ring, the first joint also with a broad median area of pale yellowish grey scales, last joint entirely white; front and mid tarsi with the first three joints white marked at base, a sprinkling of yellowish grey scales at middle of first joints, last two joints of front tarsi black, last joint of mid tarsi nearly wholly white. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis straight, long and slender. Palpi exceeding the proboscis by nearly the length of the last joint, last two joints decidedly inflated; vestiture of black scales, a narrow white ring near middle of long joint and at bases of last two joints; end of long joint and last two joints with long dense hairs, black on end of long joint, largely pale yellow on terminal joints. Antennæ plumose, the last two joints long and slender, rugose, pilose, the others short, dull luteous, with a very narrow black ring at bases of hair-whorls; hairs of whorls long, brownish-black. Coloration similar to the female, the proboscis without white ring. Wings narrower than in the female, stems of the fork-cells longer but not as long as the cells; vestiture sparse. Abdomen elongate, depressed, with dense long pale yellow lateral ciliation. Claw formula, 2.1–2.1–1.1.

Length: Body about 5 mm.; wing 4 mm.

Genitalia (plate 31, fig. 211): Side-pieces over twice as long as broad, apical lobes absent, basal lobe small, conical, densely setose. Clasp-filament long and slender, slightly swollen before middle, with a long, articulated terminal spine. Harpes flat, concave, inner margin thickened and revolute, tip forming a small outcurved point. Harpagones with a slender, columnar stem nearly as long as harpes and a long slender ligulate articulated filament at apex. Unci approximate, obscure, forming a short, rounded-tipped cylinder. Basal appendages rudimentary, bearing a few short setæ.

Larva, Stage IV (see figure of entire larva, plate 62).—Head rounded, prominent on the sides, narrowed before eyes, front margin arcuate. Antennæ small, subcylindrical, sparsely spined; tuft short and of few hairs, before middle; one longer and three shorter spines at tip and a stout digit on a pedestal. Eyes large, transverse, pointed. Both pairs of dorsal head-hairs single, rather long; ante-antennal tuft multiple, short. Mental plate triangular, wide, apical tooth stout, with eleven teeth on each side about alike. Mandible quadrangular, the tip pointed; two filaments before the collar with a row of cilia outwardly; eight filaments and three plumose hairs on outer edge; a lump and several oblique teeth before dentition, which is of four teeth scarcely raised, the first the largest, a broad filament and three feathered hairs within; process below furcate, with hair-patches; some hair within basal angle; six stout hairs at base. Maxilla hemispherical, divided by a suture; both halves irregularly and sparsely haired, a tuft of hairs at tip; outer half with two filaments toward the suture; palpus constricted centrally, with four terminal digits, of which one is rather long. Thorax rounded, wider than long, robust; hairs abundant, short, subdorsal prothoracic ones single. Abdomen rather stout, posterior segments more elongate; hairs short, the lateral ones multiple on first two segments, double on third to sixth; secondary hairs short. Tracheal tubes broad, band-shaped, slightly constricted in the segmental incisures. Air-tube stout, tapered outwardly, twice as long as wide; pecten reaching over halfway, the teeth evenly and closely set; single tooth a long spine with wide base and three rounded branches; a tuft at

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outer third of tube beyond pecten. Lateral comb of eighth segment of few scales in a small triangular patch; single scale elliptical, with a long stout spinule at tip, the sides fringed with shorter ones. Anal segment not as long as wide, ringed by the plate; dorsal tuft a brush and hair on either side; a single lateral hair; ventral brush well developed, of short tufts, posteriorly situated, confined to barred area. Anal gills very short, bud-shaped.

Egg (plate 146, fig. 679).—Fusiform, slightly flattened on one side, the ends roundedly pointed; a gelatinous cushion at micropyle; sculpture roundedly quadrangular or subhexagonal, the transverse angles slightly pointed.

The eggs are laid on the ground in the salt-marshes, in depressions that are filled by the high tides. Often such places are behind a sand barrier that is overwashed only at the highest tides or in a storm. Occasionally the pools may be filled by rain water. In either case the eggs hatch and the larvæ develop. Professor Smith states that the larvæ will develop in water 25 per cent more salt than ordinary sea water. The larvæ occur in those pools nearest the sea that are isolated and therefore more or less free from enemies. There are a series of broods during warm weather, determined by the conditions which cause the eggs to hatch and permit the larvæ to develop. The females fly for considerable distances inland and are persistent and troublesome biters. Professor Smith has studied the species in New Jersey and says:

"When the eggs become covered with water by rains or by the tides the larvæ develop and emerge, often within a period of minutes rather than hours. They thrive equally well in salt water or in fresh water and develop most rapidly where the food supply is most abundant. I have never found this species breeding elsewhere than on the marsh or at its very borders, in the salt hay zone along shore which cannot exactly be called marsh. It is always a shore or marsh mosquito and every little hole on the marsh may breed it. A week is all that is necessary to bring the larva to maturity, and the pupal stage is short or long, according to temperature.

"At Anglesea young larvæ were taken by Mr. Dickerson as early as March 5th, though development at that period is slow. March 12th larvæ were more abundant and evidently developing generally. At that time Mr. Dickerson tested the temperature of the water in which larvæ occurred and found that it ranged from 42 degrees to 50 degrees Fahrenheit. At this temperature microscopic life multiplies slowly and the wriggler food supply is limited; therefore this first brood of larvæ dawdles along for a month before adults are ready to emerge. Breeding continues until early October; but after that few eggs remain to be developed, except for the spring following. If the wriggler succeeds in reaching the pupal stage before a pool dries up it is usually safe, for the pupa will live twenty-four hours in soft mud and develop as an adult; indeed not more than twelve hours is really needed, because I have had mosquitoes emerge within that period. Larvæ more than half grown will survive in soft mud a few hours, and if the pool is then refilled by rain or tide will revive and complete their transformations."

The females leave the marshes in search of food, after having mated, and have been known to travel inland as far as 40 miles. Concerning these flights of this species, and of *Aëdes taeniorhynchus* and *cantator*, which occur more or less in association, Professor Smith says:

"Prior to 1902 the belief was that only in isolated instances, under exceptional conditions, did mosquitoes fly more than a short distance from the place where they became adult. Their radius of flight was expressed sometimes in feet, more rarely in yards, and almost never in fractions of a mile. Based upon

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that belief was the conclusion that mosquito control was purely a local matter and that almost any community could rid itself of trouble no matter what the surroundings might be; provided, of course, they were a reasonable distance away. No one fact in mosquito history impressed itself quite so firmly upon the mind of the public that looked into the matter at all, and the result was, in New Jersey, a series of local efforts in the most progressive communities. These communities did not take kindly to the suggestion when first made, that the bulk of their mosquito supply was not a local product, and some of them continued their hopeless task until the overwhelming swarms of 1903 and early 1904 seemed to prove all their previous efforts worthless and made them a laughing stock.

"Yet the very earliest systematic collections demonstrated that certain species might be present in overwhelming numbers where no trace of their larvæ could be found. *Culex sollicitans* was the species that first attracted attention, partly because in my cranberry investigations in the pine regions it swarmed so numerously; partly because it was that year also the dominant species at New Brunswick. I have elsewhere spoken of my efforts to obtain eggs and larvæ of this species and my failure to find them inland, while at the shore every pool swarmed with them. My first shore collections were made at Anglesea, where *sollicitans* was at that time the dominant species. For that reason I did not find *cantator* and believed *sollicitans* the sole migrant. In 1902 Mr. Brehme took the field, Mr. Dickerson was detailed as opportunity served, and I devoted all available time to the same end. Never were marshes more thoroughly explored, and the result was that instead of one, we found four species breeding on them. Furthermore, we failed absolutely to find any of these larvæ anywhere on the upland, though we found plenty of others. Except for *Culex salinarius*, the adults from these marsh wrigglers were found miles inland, infernal nuisances, where locals were almost or entirely absent.

"In 1903, with additional funds, I had six men in the field and the voluntary assistance of Mr. Brakeley. Dr. Julius Nelson, Professor of Biology, engaged in oyster work along the shore, was also good enough to make certain observations for me, and the result was a complete demonstration of the migratory habits of *Culex sollicitans, C. cantator* and *C. tæniorhynchus*. The observations made during the early season of 1904, with fuller knowledge of the factors, were equally conclusive. The development of the broods on the Newark and Raritan marshes was watched almost from day to day. Before the larvæ matured, careful search was made for several miles back and along the first ridge of the Orange Mountains to make certain of what was developing there. The appearance of the adults was noted on the meadows, before a single specimen was seen in Newark. They were watched for a day or two slowly advancing until, a favorable night happening, the ever-increasing swarms arose and next morning had settled along the first ridge of the mountains. The second brood, maturing during the last days of June, was watched in the same way, and the early days of July, 1903, brought inland the greatest swarm of mosquitoes I have ever seen. They reached New Brunswick July 2d, and included the three species, *sollicitans, cantator* and *tæniorhynchus*. Meanwhile, Mr. Viereck was observing at Cape May, and watched the peninsula filling with *sollicitans* bred at the shore; not a larva of which he could find where the adults swarmed. He noted that after a continuous south wind the marshes became practically free from mosquitoes, and he noted further that a few days later blood-filled specimens with developing or developed ovaries returned to them from the upland. This seemed to him in the nature of a return migration for oviposition as all specimens were worn and battered.

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"From the Newark Marshes—using that term generally to include also all that section within the corporate limits of Elizabeth—the insects were traced to the second ridge of the Orange Mountains, to Paterson, to Morristown, and to Summit, in gradually decreasing numbers.

"From the Raritan Marshes they were traced along the river to Bound Brook, to Somerville, to Dunellen and to Plainfield. Just how far inland this swarm penetrated I do not know.

"Meanwhile Dr. Nelson was observing along the shores of Great Bay and the mouth of the Mullica River, finding little mosquito trouble on the marsh until July 12th. On or about that day an extra high tide came over it, and on the 13th minute wrigglers were in every water-filled hole. Cold, wet weather retarded development, but on the 21st males were out in clouds and everything was in the pupal stage. On the morning of the 22d the females were out, but would not bite. On the evening of the 23d it was warm, with only a slight breeze, and the Doctor was brought from his hut by a peculiar humming noise which seemed to fill the air. He located its source at last between sixteen and twenty feet high above the marsh, where regular clouds of mosquitoes were hovering in their marriage flight. On the 24th few males were seen, but the females were in droves and as bloodthirsty as butchers. Then came cold west and north winds that kept the insects low down among the grass. On the 28th the wind veered to the south and continued all that night and all day on the 29th. On the morning of the 29th the number of mosquitoes on the marsh had diminished materially, and this was yet more decidedly marked on the morning of the 30th, when they were quite bearable. But in the woods where on the 20th there had been few mosquitoes they were worse on the 31st, when the Doctor came out to Tuckerton, than they were on the marsh itself.

"Just after receiving this account from Dr. Nelson, I received a note from Mr. Brakeley, giving in detail a record of the arrival of *Culex sollicitans* in the pines, during the nights of July 28th and 29th, increasing during the successive nights to August 1st, when they were distributed everywhere in great numbers. Previously there had been practically none of this species, and the observed departure on the 28th and 29th from the marshes and the arrivals in great swarms over thirty miles away on the days immediately following, leaves no question as to the connection between the two. That the species could have bred locally is out of question, because the larval status of the pine region was thoroughly known.

"In the Spring of 1904 weather conditions were unusually favorable for the development of a heavy brood of *cantator* along the entire coast north of the Great Bay. As early as March the larvæ were found everywhere, and on the Shrewsbury River marshes it was a race between the ditchers and the insect as to which should win out. A few cold days retarded the insects and gave the workers the chance of finishing the ditches that ran off full grown larvæ and pupæ by the millions into the maws of hungry 'killies' that followed hard after the spades. The result was, no first brood on these meadows and the consequent exemption from mosquito attack of the entire surrounding territory!

"On the Newark marshes the brood developed and early in May spread inland, covering a territory even greater than the broods of 1903, for now they were traced into the mountains north of Paterson and directly west to Bernardsville, where in ordinary seasons mosquitoes are practically unknown.

"The Raritan River brood reached New Brunswick May 12th and the nights immediately following, and extended along the valley to Somerville, following essentially the same track as in 1903.

"At Lahaway the first arrivals were noted May 17th, and by the 24th the Pines were filled with them.

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"For some reason no *sollicitans* developed on the Newark marshes up to the middle of July and not a specimen was seen or sent in by any correspondent from the towns where *cantator* swarmed. On the Raritan meadows one section developed a small brood in June, and this sent a few specimens to New Brunswick a few days thereafter.

"South of Barnegat Bay *sollicitans* equaled *cantator*, but developed a little later, so that the first arrival reached Lahaway May 23d, and after a day of steady south wind and high temperature the morning of the 29th found them present in force."

The males have been observed by Professor Smith to visit the flowers of wild cherry in numbers and Dr. C. R. Ely has taken the females at sugar-bait when collecting moths.

Atlantic and Gulf Coasts of North America, Bahamas, Cuba and Jamaica.

Lincolnville, Maine, August, 1908 (H. G. Dyar); Maine, August (C. V. Riley); Durham, New Hampshire, August 8 (H. G. Dyar); North Saugus, Massachusetts, July 2, 1906 (E. S. G. Titus); Fort Banks, Massachusetts, July 13, 1906 (through C. S. Ludlow); Beverly, Massachusetts, September 15, 1871; East Providence, Rhode Island, August, 1903 (F. C. Pratt); Weekapaug, Rhode Island, July 20, August, 1904 (H. G. Dyar); Newark, New Jersey, October 11, 1902 (H. H. Brehme); Cape May, New Jersey, April 20, 1903; Elizabeth, New Jersey, May 28, 1906 (D. S. Carmody); Ocean City, New Jersey, August, 1901 (J. Kotinsky); Center Island, New York, May 23, 1901 (H. C. Weeks); Cold Spring Harbor, New York, July 17, 1901; Sag Harbor, New York, July 7, 1903 (C. E. Wells); Bellport, New York, August, 1901 (H. G. Dyar); Sheepshead Bay, New York, June, 1903; Northport, New York, July 7, 1903 (J. P. Heyen); Center Moriches, New York, September 3, 1903 (P. Fowler); Brentwood, New York (A. D. Hopkins); Lloyd's Neck, New York, October 7, 1900 (W. J. Matheson); East River, Connecticut, July 21, 1908, at sugar (C. R. Ely); Chesapeake Beach, Maryland, May 11 (H. S. Barber); Piney Point, Maryland, June 19, 1904 (T. Pergande); St. George's Island, Maryland (T. Pergande); Ocean City, Maryland, September 16, 1913 (H. G. Dyar); Cedar Island and Paramore's Island, Virginia, July 15, 1914 (H. G. Dyar); Virginia Beach, Virginia, September 20, 1911 (H. G. Dyar); McClellansville, South Carolina, October 11, 1906; Fort De Soto, Florida (through C. S. Ludlow); Palm Beach, Florida, March 14, 1905 (H. G. Dyar); New Smyrna, Florida, March 21, 1905 (H. G. Dyar); Ocean Springs, Mississippi, November 22, 1902 (G. W. Herrick); Natchez, Mississippi, April, 1903 (A. Fleming); Mississippi River Quarantine Station (E. Souchon); Como, Franklin Parish, Louisiana, August 20, 1901 (G. E. Beyer); Johnson's Bayou, Louisiana, July 26, 1906 (J. D. Mitchell); Olivier, Louisiana, 1904 (E. S. G. Titus); New Iberia, Louisiana, October 15, 1904 (E. S. G. Titus); Corpus Christi, Texas, March 22, 1905 (W. E. Hinds); Galveston, Texas, April 16, 1905 (J. C. Crawford); Sand Point, Matagorda Bay, Texas, July 30, 1901 (J. D. Mitchell); Calhoun County, Texas, October, 1901 (J. D. Mitchell); Buna, Texas, November 14, 1902 (A. D. Hopkins); Victoria, Texas, June 13, 1904 (E. G. Hinds); Green Cay, Bahamas, June 29, 1903 (T. H. Coffin); Rum Cay, Bahamas, 1903 (T. H. Coffin); Havana, Cuba, December, 1903 (J. R. Taylor); Guanimar, Cuba (J. H. Pazos); Batabanó, Cuba (J. H. Pazos). Reported also from Vera Cruz, Mexico (Parker, Beyer and Pothier), Isle of Pines (Pazos) and Jamaica (Theobald).

Theobald records *Aëdes sollicitans* from the island of Formosa, but we feel sure that this is an error. He records it also from North Dakota and other

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interior points in North America, but these are doubtless errors of identification, the real species in question being *Aëdes nigromaculis*.

There is some range of variation in the vestiture-coloration characters of the imago, although by no means in so marked a degree as with the species of the *curriei* group. The ornamentation of the mesonotum may be distinct or nearly obsolete and varies in extent. The amount of light scaling on the abdominal segments varies, particularly with reference to the median longitudinal stripe; this is well defined in typical specimens and quadrately expanded in the middle of each segment; in others the median stripe is narrow and ill defined while in still others it is interrupted, producing a series of median segmental spots.

AËDES MITCHELLÆ (Dyar) Dyar & Knab.

Culex mitchellæ Dyar, Journ. N. Y. Ent. Soc., xiii, 74, 1905.
Grabhamia mitchellæ Dyar, Journ. N. Y. Ent. Soc., xiii, 185, 1905.
Aëdes mitchellæ Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 190, 197, 1906.
Ochlerotatus mitchellæ Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 19, 1906.
Ochlerotatus mitchellæ Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 5, 1906.

ORIGINAL DESCRIPTION OF CULEX MITCHELLÆ:

This form was collected by me in southern Georgia and Florida in temporary pools of fresh water. The adult resembles *sollicitans*, but the wing scales are wholly black, the first tarsal joint is devoid of a light colored median band and the light colored scales of the legs are pure white instead of yellow. Types, 61 specimens, U. S. National Museum, type No. 8407; one ♀ selected as the type is from Jacksonville, Fla., the larvæ in dirty recently dug holes along the railroad. Other localities are Green Cove Springs in temporary pools in the pines, Magnolia Springs in pools in swampy land, Kissimmee, in ditch, puddles and pools at the edge of swampy land, Pokatee, Fla., in a hole with old tin cans and rotten wood, and in the pine barrens of southern Georgia in a puddle by the railroad at a siding. The larva closely resembles that of *sollicitans*, but the air tube is considerably longer, being fully three times as long as wide, while the spines of the comb are unusually long and thorn-shaped.

It gives me pleasure to name this species in honor of Miss Evelyn G. Mitchell.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES MITCHELLÆ:

Female.—Proboscis moderate, subcylindrical, uniform, the labellæ conically tapered; vestiture black with a broad white ring somewhat beyond the middle; setæ minute, black, those on the labellæ more prominently outstanding. Palpi moderate, about one-fourth as long as the proboscis, black scaled, the tips white; setæ sparse, rather long, black. Antennæ with the basal joints somewhat shorter than the distal ones, rugose, pilose, black; tori subspherical, with a cup-shaped apical excavation, brown, a few yellowish scales on inner side; hairs of whorls sparse, rather short, black. Clypeus elliptical, prominent, dark brown, nude. Eyes black. Occiput dark brown, broadly clothed with coarse, narrow, curved scales which are dark golden-brown on the sides, light creamy yellow on the vertex, a number of short, erect, forked, pale scales on the nape; cheeks clothed with broad, flat, dull white scales, a large quadrate patch of black ones above at eye-margin; bristles bordering eyes few, black, a dense tuft of pale ones projecting between the eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with pale golden brown scales above, white ones below, and black bristles. Mesonotum blackish, densely clothed with narrow rich golden brown scales, a very broad, lighter more yellowish median stripe, bordered along its sides by narrow stripes of pale yellowish scales, brightest and most distinct posteriorly, scales of this lighter color about antescutellar space and in short stripes over roots of wings, broad stripes of deep brown scales along humeral angles; bristles rather short, blackish. Scutellum trilobate, brownish, clothed with pale ochraceous scales, each lobe with a group of pale brown bristles. Postnotum shortly conical, prominent, brown

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with irregular black streaks, nude. Pleuræ and coxæ brown, clothed with elliptical, flat, pure white scales and rather numerous short bristles, which are pale on the pleuræ but blackish on the anterior coxæ.

Abdomen subcylindrical, posterior segments tapering; dorsal vestiture of black scales, a broad, irregular median stripe of sordid yellowish white ones, a transverse band of the same color at base of each segment; along the sides a row of median segmentary pure white patches, larger posteriorly; in some specimens the median stripe is represented by a series of quadrate segmental spots; first segment with a patch of yellowish white scales and with many fine pale hairs; venter clothed with black and white scales, the white predominating, the black forming a diffused median line. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell also shorter but less markedly so; basal cross-vein about its own length distant from anterior cross-vein; scales of veins black, rather broad, a slight denser aggregation of scales at base of third vein and furcation of second; outstanding scales along second and third veins and along ends of all the veins linear, black. Halteres entirely pale.

Legs rather slender; femora clothed with black and white scales, the black ones predominating dorsally, extreme tips white; tibiæ with pure white and black scales intermixed, the black predominating, a broad black apical ring and a very narrow white basal spot, the stout erect setæ dark brown; tarsi black, each joint of hind tarsi with a broad white basal ring, the first joint also with scattered white scales, the last entirely white; fore and mid tarsi with the white rings narrower, the last two joints entirely black. Claw formula, 1.1–1.1–0.0.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis straight, slender, the white ring narrow and before the middle. Palpi exceeding the proboscis by nearly the length of the last joint, last two joints decidedly inflated; vestiture of black scales, a narrow white ring in middle of long joint and at bases of last two joints; end of long joint and last two joints with long dense hairs, black on end of long joint, partly pale yellow on terminal joints. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, dull luteous, with a very narrow black ring at bases of hair-whorls; hairs long, dense, brownish-black. Coloration similar to the female. Wings narrower than in the female, stems of the fork-cells longer but not as long as the cells; vestiture sparse. Abdomen elongate, depressed, with dense, pale, long, lateral ciliation. Claw formula, 2.1–1.1–0.0.

Length: Body about 5 mm.; wing 4 mm.

Genitalia (plate 31, fig. 212): Side-pieces over twice as long as broad, apical lobes absent, basal lobe small, conical, densely setose. Clasp-filament long and slender, slightly swollen toward middle, with a long articulated terminal spine. Harpes flat, concave, inner margin thickened and revolute, tip forming a small outcurved point. Harpagones with a slender columnar stem slightly longer than harpes and a long slender ligulate articulated filament at apex. Unci approximate, obscure, forming a short rounded-tipped cylinder. Basal appendages rudimentary, bearing a few short setæ.

Larva, Stage IV (plate 117, fig. 404).—Head rounded, prominent on the sides, narrowed before eyes, front margin arcuate. Antennæ subcylindrical, sparsely spined; tuft rather short, slightly before the middle; one long and three shorter spines at tip and a digit on a pedestal. Eyes large, transverse, pointed. Both pairs of dorsal head-hairs single, ante-antennal tufts multiple. Mental plate triangular, wide, with a stout apical tooth and eleven teeth on each side, the apical ones crowded, the basal ones more pointed and remote, the last small

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and very remote. Mandible quadrangular, in outline an oblique parallelogram, a rather large patch of spines at base; two filaments before tip from a distinct notch; an outer row of cilia from a collar; eight filaments and three plumose hairs on outer edge, rather close to collar; a long stout spine beyond; dentition of four teeth on a process, first and third longer; a stout tooth before, a broad filament within and a short furcate tooth at base; process below furcate, with hair patches; five long hairs within; basal angle rounded; a row of long hairs at base. Maxilla irregularly hemispherical, divided by an oblique suture; inner half covered with numerous thick short tufts at ends of stout papillæ; a tuft of hair at tip; outer half with two filaments next the suture preceded by an oblique band of hair; a stout spine on other side; palpus short, slightly constricted centrally, with four minute apical digits. Thorax rounded, wider than long, robust; hairs abundant, short, the subdorsal prothoracic ones single. Abdomen stout, the posterior segments more elongate; hairs short, the lateral hairs multiple on first two segments, triple on third, double on fourth to sixth. Tracheal tubes broad, band-shaped. Air-tube moderately stout, tapered outwardly, about three and a half times as long as wide; pecten reaching nearly halfway, the teeth evenly and closely set, followed by a multiple hair-tuft; single tooth a long spine with stout base, a single stout tooth and several small ones near base, the other side with many small spinules. Lateral comb of eighth segment of about eighteen scales in a triangular patch; single scale elliptical, with a long stout spinule at tip, the sides fringed with very short ones. Anal segment about as long as wide, ringed by the plate; dorsal tuft a brush and hair on either side; a single lateral hair; ventral brush well developed, confined to barred area, of short tufts posteriorly situated. Anal gills rather short.

The larvæ live in temporary ground-pools of fresh rain-water. The specimens were all found early in spring, but it seems probable that there may be later broods.

South-eastern United States.

Southern Georgia, March 2, 1905 (Dyar and Caudell); Jacksonville, Florida, March 2, 1905 (Dyar and Caudell); Magnolia Springs, Florida, March 3, 1905 (Dyar and Caudell); Green Cove Springs, Florida, March 4, 1905 (A. N. Caudell); Kissimmee, Florida, March 19, 1905 (H. G. Dyar); Mobile, Alabama, March, 1905 (G. Dimmock).

Aëdes mitchellæ varies in coloration of the imago in a similar manner to *A. sollicitans*. It much resembles this species and the dorsal stripe of the abdomen is widened quadrately on the segments in the same way; this dorsal stripe and the abdominal basal bands may be pale ocherous or they may be nearly pure white, like the lateral spots.

AËDES TÆNIORHYNCHUS (Wiedemann) Busck.

Culex tæniorhynchus Wiedemann, Dipt. Exot., 43, 1821.
Culex damnosus Say, Journ. Acad. Nat. Sci. Phil., iii, 11, 1823.
Culex tæniorhynchus Robineau-Desvoidy, Mém. Soc. Hist. Nat. Paris, iii, 409, 1827.
Culex tæniorhynchus Wiedemann, Aussereur. zweifl. Ins., i, 8, 1828.
Culex damnosus Say, Ent. of No. Amer., ii, 40, 1883.
Culex tæniorhynchus Giles (in part), Gnats or Mosq., 245, 1900.
Culex tæniorhynchus Theobald (in part), Mon. Culic., i, 350, 1901.
Culex tæniorhynchus Coquillett in Howard, Mosquitoes, 237, 1901.
Culex tæniorhynchus Neveu-Lemaire, Arch. Parasit., vi, 8, 1902.
Theobaldia tæniorhyncha Neveu-Lemaire, Mém. Soc. Zool. France, xv, 213, 1902.
Culex tæniorhynchus Dyar, Proc. Ent. Soc. Wash., v, 48, 1902.
Culex tæniorhynchus Smith, Ent. News, xiii, 300, pl. xv, f. 5, 1902.
Culex tæniorhynchus Giles, Gnats or Mosq., 2 ed., 397, 1902.
Culex tæniorhynchus Dyar, Journ. N. Y. Ent. Soc., xi, 23, 1903.
Culex tæniorhynchus Theobald (in part), Mon. Culic., iii, 158, 1903.
Culex tæniorhynchus Dyar, Proc. Ent. Soc. Wash., v, 146, 1903.

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Culex tæniorhynchus Johannsen, Bull. 68, N. Y. State Mus., 416, 1903.
Culex tæniorhynchus Smith, Rept. Ent. Dept., N. J. Exp. Sta., 1902, 529, 1903.
Culex tæniorhynchus Parker, Beyer & Pothier, Bull. 13, Yellow Fever Inst., Publ. Health & Mar. Hosp. Serv., 38, 1903.
Culex tæniorhynchus Smith, N. J. Agr. Exp. Stat., Bull. 171, 21, 1904.
Culex tæniorhynchus Felt, Bull. 79, N. Y. State Mus., 301, 1904.
Culicelsa tæniorhynchus Felt, Bull. 79, N. Y. State Mus., 391b, 1904.
Culex tæniorhynchus Lutz in Bourroul, Mosq. do Brasil, 73, 1904.
Culex tæniorhynchus Ludlow, Can. Ent., xxxvi, 236, 301, 1904.
Culicelsa tæniorhynchus Dyar, Proc. Ent. Soc. Wash., vii, 48, 1905.
Culex tæniorhynchus Smith, N. J. Agr. Exp. Stat., Rept. Mosq., 216, 1905.
Culicelsa tæniorhynchus Felt, Bull. 97, N. Y. State Mus., 473, 1905.
Culex tæniorhynchus Blanchard (in part), Les Moustiques, 291, 1905.
Theobaldinella tæniorhynchus Blanchard, Les Moustiques, 393, 1905.
Culex tæniorhynchus Britton & Viereck, Rept. Conn. Agr. Exp. Stat., 1904, 270, 272, 274, 1905.
Aëdes damnosus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 198, 1906.
Culex tæniorhynchus Mitchell, Psyche, xiii, 11, 1906.
Ochlerotatus tæniorhynchus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 19, 1906.
Ochlerotatus damnosus Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 5, 1906.
Aëdes damnosus Dyar, Proc. U. S. Nat. Mus., xxxii, 127, 1907.
Culicelsa tæniorhynchus Theobald, Mon. Culic., iv, 377, 1907.
Culex tæniorhynchus Howard, Osler's Modern Medicine, i, 376, 1907.
Culex tæniorhynchus Aiken, Brit. Guiana Med. Annual, 1906, 67, 69, 1907.
Aëdes tæniorhynchus Busck, Smiths. Misc. Colls., quart. iss., iii, 63, 1908.
Culicelsa tæniorhynchus Peryassú, Os Culic. do Brazil, 46, 185, 1908.
Culicelsa tæniorhynchus Theobald (in part), Mon. Culic., v, 316, 1910.
Culex damnosus Theobald, Mon. Culic., v, 395, 1910.
Aëdes tæniorhynchus Morse, Ann. Rept. N. J. State Mus., 1909, 717, 1910.

ORIGINAL DESCRIPTION OF CULEX TÆNIORHYNCHUS:

Fuscus, fascia media proboscidis articulorumque tarsorum basi albis. Longit. lin. 2½. fem. Mexico.

Proboscis fusco-nigra, fascia lata alba. Antennae nigro-fuscae; palpi nigro-fusci apice albi. Thorax nigro-fuscus, pleuris paulo dilutoribus. Abdomen nigro-fuscum, incisuris albicantibus. Alae limpidae fusco-squamulosae. Femora flavicantia; tibiae et tarsi nigro-fusca; horum singuli articuli basi albi. Mus. de Winthem et nostrum.

ORIGINAL DESCRIPTION OF CULEX DAMNOSUS:

Rostrum and tarsi annulate with white.

Inhabits Pennsylvania.

Head above with rather long yellow-ferruginous hair; *antennae* pale-brownish; *rostrum* blackish, with a broad white band on the middle; *thorax* black, with three cinereous lines, and clothed with yellow-ferruginous short hair; *scutel* dull testaceous; *pleura* grayish; *feet* pale, covered with blackish hair; joints of the tarsi, excepting the first, whitish at their bases; *tergum* brown, basal margins of the segments cinereous-whitish.

Length a quarter of an inch.

This is one of the most common and troublesome of our mosquettoes. It seems to correspond in some degree with the *cingulatus* Fabr., although we must infer from his description, that the posterior tarsi only are annulated. Wiedemann considers the *cingulatus* as the male of his *molestus*, of which all the tarsi are annulated, like those of our species. I feel however perfect confidence in the description of Wiedemann, and therefore must consider our species distinct, inasmuch as the thorax is not "lateribusque niveis;" and from the laudable accuracy of that author, I cannot suppose that he would have overlooked the annulation of the proboscis, which certainly exists in this species.

DESCRIPTION OF FEMALE, MALE, LARVA, AND EGG OF AËDES TÆNIORHYNCHUS:

Female.—Proboscis rather long, moderately slender, cylindrical, the labellæ conically tapered; vestiture black with a white ring at middle; setæ minute, black, those on labellæ more prominently outstanding. Palpi short, rather stout, about one-fifth the length of the proboscis, black scaled, the tips white; setæ moderate, black. Antennæ with the distal joints longer than the basal ones, rugose, black, pilose; tori subspherical, with a cup-shaped apical excavation, brown, a patch of silvery scales on inner side; hairs of whorls moderate, sparse,

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black. Clypeus elliptical, prominent, dark brown, nude. Eyes black. Occiput dark brown, broadly clothed with narrow curved yellow-brown scales on the vertex, the ocular margins narrowly white-scaled, cheeks clothed with broad flat scales, mostly white, an oblique black patch above on ocular margin, numerous upright, black, forked scales on the nape; bristles moderate, dark brown, dense on vertex and projecting between eyes.

Prothoracic lobes elliptical, remote dorsally, dark brown, clothed with narrow, curved, bronzy-brown scales and black setæ. Mesonotum dark brown, thickly clothed on disk with narrow curved dark golden-brown scales, humeri deep brown scaled, lighter, almost silvery scales over the roots of the wings and about the antescutellar space; bristles moderate, black; in some specimens there are present lighter golden brown maculations. Scutellum trilobate, brown, clothed with brassy scales, like those around the antescutellar space, each lobe with a group of brown setæ. Postnotum conical, prominent, luteous brown, nude. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat, white scales and pale setæ; anterior coxæ mostly dark scaled.

Abdomen subcylindrical, flattened, posterior segments tapering, the cerci exserted; dorsal vestiture of dull black scales, each segment with a narrow basal band of sordid yellowish-white scales, a row of lateral, triangular, pure white patches medianly at the sides of the segments, somewhat larger posteriorly, the last two visible from a dorsal view; venter yellow and white scaled intermixed with black scales, with subapical black bands, often interrupted at the middle or obsolete. Cerci black.

Wings moderate, hyaline; faintly infuscated; petiole of second marginal cell shorter than its cell, that of second posterior cell nearly equal to its cell; basal cross-vein about its own length distant from the anterior cross-vein; scales of the veins black, the outstanding ones broadly linear, a very slight thickening of the scales at base of third vein. Halteres pale.

Legs moderately slender; femora pale beneath, black scaled above and at tip; knees white; tibiæ black, the stiff outstanding setæ pale, under side pale-yellowish scaled, a few spots of yellow scales on outer side; tarsi black, first joint of fore and middle legs with yellowish scales intermixed, each joint of hind tarsi with a rather broad white basal ring, the last joint wholly white; fore and middle tarsi with the white rings narrow, the last two joints wholly black. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Male.—Proboscis straight, long and slender, the white ring narrow and before the middle. Palpi as long as the proboscis, the last two joints slightly enlarged, a broad white ring before middle of long joint and narrower ones at bases of last two joints; end of long joint and the last two joints with long black hairs. Antennæ plumose, the last two joints long and slender, pilose, rugose, black, the others short, brownish, with a narrow black ring at the insertions of the hair-whorls; hairs long, dense, black with a brownish tint. Coloration similar to the female. Wings narrower than in the female; stems of fork-cells longer, vestiture scanty. Abdomen elongate, depressed, the basal segmental white bands broader than in the female, the lateral spots obsolete on all but the sixth and seventh segments; sides with abundant, long, dull brownish ciliation. Claw formula, 2.1–1.1–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 30, fig. 205): Side-pieces more than twice as long as wide, inner third divided by a slight groove, apical lobe absent, basal lobe small, conically prominent, densely setose. Clasp-filament large, rather strongly swollen medianly, with a long, terminal articulated spine. Harpes concave, elliptical, inner margin thickened and revolute, apex produced into a short stout

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point directed outward. Harpagones with a long columnar minutely setose base, bearing a ligulate terminal filament which tapers to the tip and bears a short retrose branch about the middle. Unci obscure, forming a short stout basal cylinder. Basal appendages short, stout, with a number of setæ.

Larva, Stage IV.—Head rounded, prominent on the sides, narrowed before eyes, the front margin arcuate. Antennæ subcylindrical, slightly tapered, very sparsely and minutely spined all over; tuft small, before the middle; a long spine and two short ones at tip, a sessile digit and one on a pedestal. Both pairs of dorsal head-hairs single, slight, ante-antennal tufts multiple. Mental plate triangular, the central tooth large, with eleven teeth on each side, dense toward tip, remote at base. Mandible quadrangular, wide at the tip; two long filaments near tip; an outer row of stout cilia; eleven filamentous cilia on the outer edge; dentition of four teeth on a prominence, the first and third longer; two filaments before, one within and two trifid teeth at base; process below furcate, with groups of hairs; a row of five large setæ; an angle below; nine large setæ at base, the outer ones longer. Maxilla irregularly hemispherical, divided by a suture; inner half wide, angled on outer edge, with stiff papillæ without and sparse hairs next the suture, a crown of hairs at tip and a feathered filament; outer half largely hairy, with two filaments distant from the suture; palpus about three times as long as wide, truncate at tip, with two slight and two minute digits. Body with the skin pilose. Thorax rounded, wider than long, robust; hairs abundant, short, the subdorsal prothoracic ones single. Abdomen stout, the posterior segments more elongate; skin pilose; hairs short, the lateral hairs multiple on first two segments, triple on third to fifth, single on sixth. Tracheal tubes broad, band-shaped, slightly constricted at the segmentations. Air-tube stout, tapered outwardly, one and a half times as long as wide; pecten reaching halfway, the teeth evenly and closely set, followed by a multiple hair-tuft; single tooth a stout spine, wide at base, with four stout branches on each side. Lateral comb of the eighth segment of about twenty scales in a small triangular patch; single scale sole-shaped, broadly rounded at tip, with fourteen terminal spinules, nearly alike, only the basal ones shorter. Anal segment not as long as wide, ringed by the plate; dorsal tuft a brush and hair on either side; a single lateral hair; ventral brush well developed, of short tufts, posteriorly situated, confined to barred area. Anal gills very short.

Egg (plate 146, fig. 678).—Fusiform, slightly flattened on one side, a gelatinous cushion at the micropyle; sculpture irregularly hexagonal, elongated in the long diameter of the egg.

The larvæ live in brackish or fresh water pools near the sea. They do not normally occur quite so near the sea as the larvæ of *Aëdes sollicitans,* preferring water with less salt, but under special conditions they occur mixed with them. The eggs are laid in the mud and hatch when the pools are filled, a set of larvæ appearing on each such occasion. Professor Smith, who studied the species in New Jersey, says of the larval habits:

"These are like those of *sollicitans* and *cantator* and with their larvæ those of *tæniorhynchus* also occur. None of our collections show larvæ of this species only, though Mr. Viereck's material approached this point very nearly at one period. As a rule they are in the small minority. In a mass of partly grown larvæ there is little apparent difference between the three species, but when full grown the maculate heads of *cantator* and *tæniorhynchus* are characteristic, while between these the very short anal siphon distinguishes the latter.

"Practically everything that has been said of the habits of the two other species above mentioned applies to *tæniorhynchus* as well. As the species is more southern in its range, *sollicitans* is its companion more frequently than *cantator.*"

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Professor Smith's observations were made at the northern extreme of the range of the species. His statements regarding the association of the larvæ with those of *Aëdes sollicitans* and *cantator* applies only in the more northernly localities. To the southward the larvæ of *tæniorhynchus* usually appear unassociated with other species.

Dr. Dyar found the larvæ upon the salt-marshes of southern California, where a brood appeared in the highest pools at each monthly high tide. They followed the appearance of *Aëdes squamiger,* with which they were mixed. In Mexico and Central America, Mr. Knab frequently found the larvæ in large numbers in pools of rain-water, but only within the tide-water region. Discussing the habits of the adult in New Jersey Professor Smith says:

"In a general way, the habits of this species are like those of *sollicitans,* but it is not nearly so abundant. It is strictly a marsh mosquito, and has never been bred anywhere else, but it also migrates, though not so generally and not so far. It reaches New Brunswick from the Raritan meadows in small numbers, but it has never been sent in by Mr. Brakeley from Lahaway, so that it is distinctly inferior in its spread to both *sollicitans* and *cantator.* Nor is it equally abundant throughout its range. From the sections north of the Barnegat Bay, collections early in the season have shown few or no specimens: later they become more abundant; but from two to ten per cent. of the bred specimens was the best secured at any time from the collections made by Messrs. Brehme and Grossbeck. At Atlantic City I found the species active and biting during the day quite as abundantly as *sollicitans.* At Anglesea a series of porch captures in August made during the late afternoon, showed both species equally present. In the examination of Mr. Viereck's material some lots were nearly 50 per cent. *tæniorhynchus,* and in one lot of between four hundred and five hundred only five per cent. were *sollicitans,* the remaining 95 per cent. being of this species. These, however, are abnormal percentages, and on the marsh itself the captured adults show no such equality with the larger species. I have never observed *tæniorhynchus* crawl up the legs of the marsh tramper as its ally does, but it may do so where it is most abundant.

"Mr. Viereck failed for a long time to find gravid examples of this species, but late in the season he collected a lot of specimens attracted to the electric lights and found them mostly gravid examples of *tæniorhynchus, sollicitans, salinarius,* and *crucians.* He duplicated that collection later and thereafter found no difficulty in obtaining specimens with developed ova. . . .

"As to the bite, that is much like that of *sollicitans* and, like that species, *tæniorhynchus* takes no long thought in reaching a proper spot; any exposed place will answer and it has the same ankle-seeking propensity that its allies have. I have never taken it indoors, even along shore.

"The egg-laying habits are like those of *sollicitans* and the eggs themselves have not been found separable from those of its ally. In fact, in my first experiments I bred more *tæniorhynchus* than I did *sollicitans* from the egg-filled sods collected."

In the warmer parts of continental America *Aëdes tæniorhynchus* is the common coast species and sometimes appears in enormous numbers when the conditions favor the production of a brood. It has the same tendency to migrate as *A. sollicitans* and has been taken far inland. Swarms of this mosquito have been reported at sea, in the Gulf of Mexico, many miles from land. The species is replaced by closely related forms in the Antilles, on the west coast of South America and on some of the Pacific islands.

Atlantic coast of America, exclusive of the Antilles; Pacific coast from southern California southward.

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Bellport, New York, August, 1902 (H. G. Dyar); Babylon, New York, July 1, 1903 (W. W. Hewlett); Sag Harbor, New York, July 7, 1903 (C. E. Wells); East River, Connecticut, July 27, 1908 (C. R. Ely); Piney Point, Maryland (T. Pergande); Chesapeake Beach, Maryland, August 21, 1906 (F. Knab); Ocean City, Maryland, September 16, 1913 (H. G. Dyar); Virginia Beach, Virginia, September 20, 1911 (H. G. Dyar); Ruddock, Louisiana, July 17, 1901; Baton Rouge, Louisiana (J. W. Dupree); Victoria, Texas, May 5, October 24, 1904 (E. G. Hinds); Calhoun County, Texas, October, 1901 (J. D. Mitchell); Cypress Bayou, Texas (J. D. Mitchell); San Diego, California, June 2, 1906 (Dyar and Caudell); Carpenteria, California, July 2, 1906 (H. G. Dyar); Tampico, Mexico, December 5, 1909 (F. C. Bishopp); Vera Cruz, Mexico, July 20, 1902 (G. E. Beyer); Salina Cruz, Mexico, July 7, 1905 (F. Knab); Santa Lucrecia, Mexico, June 19, 1905 (F. Knab); Coatzacoalcos, Mexico (A. Dugès); Tonala, Mexico (A. Dugès); San Blas, Mexico (A. Dugès); Las Peñas, Tepic, State of Jalisco, Mexico (A. Dugès); Progreso, Yucatan, December 11, 1907 (F. Knab); Belize, British Honduras (R. H. Peters); Champerico, Guatemala, August 4, 1905 (F. Knab); San José, Guatemala, August 6, 1905 (F. Knab); Puerto Barrios, Guatemala; Corinto, Nicaragua, September 4, 1905 (F. Knab); Puntarenas, Costa Rica, September 7, 1905 (F. Knab); La Boca, Canal Zone, Panama, June 14, July 20, 1907 (A. Busck); Pedro Miguel, Canal Zone, Panama (A. H. Jennings); Tabogilla Island, Panama (A. H. Jennings); Colon, Panama, May 19, 1904 (A. C. H. Russell); Corozal, Canal Zone, Panama, May 4, 1908 (A. H. Jennings); Miraflores, Canal Zone, Panama, May 9, 1908 (A. H. Jennings); Ancon, Canal Zone, Panama, June 10, 1908 (A. H. Jennings); Trinidad, West Indies, June, 1905 (A. Busck); Corentyne Coast, British Guiana, June 1, 1906 (J. Aiken); Georgetown, British Guiana (E. D. Rowland); Berbice, British Guiana, June 7, 1907 (J. Aiken); Paramaribo, Surinam (Dr. Van Hall); Surinam (H. Polak). Also reported from Pará and Rio de Janeiro, Brazil (Peryassú).

Aëdes taeniorhynchus is reported by Theobald, on the authority of Miss Ludlow, from localities in Arizona and Illinois; as the species breeds only within tide-water, and the flight of the adult does not range beyond 40 miles at the most, these records are clearly based on misidentifications. We are also inclined to doubt the records from the same authorities of its occurrence at Fort Wright, Washington, and Fort Morgan, Alaska. The species is also reported from Florida, but the many specimens we have examined from various localities in Florida have proved to be the closely related Antillean form *Aëdes niger*.

AEDES NIGER (Giles) Pazos.

Culex taeniorhynchus Theobald (in part), Mon. Culic., i, 350, 1901.
Culex taeniorhynchus Taylor (not Wiedemann), Rev. de Med. Trop., iv, 146, 156, 1903.
Culex taeniorhynchus Theobald (in part), Mon. Culic., iii, 158, 1903.
Culex taeniorhynchus Pazos (not Wiedemann), Bull. Soc. Ent. France, 134, 1904.
Taeniorhynchus niger Giles, Journ. Trop. Med., vii, 382, 1904.
Culex taeniorhynchus Theobald (not Wiedemann), Mosq. or Culic. of Jamaica, 22, 1905.
Culex taeniorhynchus Coffin (not Wiedemann), in Shattuck, The Bahama Ids., 287, 1905.
Culex portoricensis Ludlow, Can. Ent., xxxvii, 386, 1905.
Aëdes niger Pazos, San. y Ben., ii, 48, 326, 1909.
Culicelsa taeniorhynchus Theobald (in part), Mon. Culic., v, 316, 1910.
Culex portoricensis Theobald, Mon. Culic., v, 334, 1910.
Taeniorhynchus (?) niger Theobald, Mon. Culic., v, 430, 1910.

ORIGINAL DESCRIPTION OF TAENIORHYNCHUS NIGER:

♀. Head with a median area on the occiput clothed with golden falciform scales like those of *Howardina*, and also with two strong brown bristles projecting forwards between the antennæ. Nape densely clothed with yellow and brown forked scales;

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lateral flat-scaled areas with a black spot behind the eyes enclosed in a loop of white. Palpi brown, with white tips. Scutellum with yellowish falciform scales; pleurae and coxae with some whitish bars and specks. Halteres entirely pale yellow, densely scaled.

This species closely resembles *C. impellens*, Walker, in ornament, but differs in having snowy apical lateral spots on all but the last abdominal segment; *C. impellens* having simply basal bands, besides which, of course, the dense scaly armature of the wing, though the scales are rather narrow for the genus, is alone sufficient to distinguish them. Rather over medium size.

Habitat.—Antigua. July 21st, 1901, from a collection sent by Dr. Forrest.

The following is an abstract of the table:

I. Species whose proboscides exhibit a paler band.
  C. The scales of the wings uniformly of one colour, or at any rate not brindled.
    a. With the abdominal segments basally pale banded.
      i. With the tarsi basally pale banded.
        9. *T. niger, sp. n.* Wing black. Band of proboscis sharply defined, rather narrow, placed at the middle. Abdominal segments sooty, with narrow white bands of uniform width. Tarsal banding extremely minute, especially on distal joints. Thorax sooty-grounded, with deep golden-brown curved scales, rather paler at the sides behind. A very sombre species, with apical lateral spots to the abdominal segments, not visible from above, and the venter impure white, with narrow black bands across the apices of the segments.

ORIGINAL DESCRIPTION OF CULEX PORTORICENSIS:

♀. Head dark, with a narrow median line of ochraceous curved scales, light forked scales upon the occiput, and reaching well up toward the vertex; the median curved scales followed by light flat scales and a narrow stripe of dark flat scales on the side; antennae dark brown, verticels and pubescence brown, basal joint brown, with a few flat lighter brown scales; palpi dark brown, a few white scales at the tips; proboscis very long, dark brown, with a minute white band, at times merely a trace, near the middle; clypeus dark brown; eyes brown and garnet.

Thorax dark brown; prothoracic lobes with light spindle-shaped scales; mesonotum sparsely covered with small, slender curved golden brown scales on the sides, the median portion partly denuded, but some dark brown spindle-shaped scales remaining; scutellum dark, with light, slender curved scales; pleura dark brown, with numerous small patches of flat, white scales; metanotum dark brown.

Abdomen dark, covered with dark brown scales; very narrow basal white bands, and small basal white lateral spots; venter mostly white scaled.

Legs. Coxae and trochanters dark, with light scales; femora dark brown dorsally, almost white ventrally, more markedly so on the hind legs; tibiae brown, as are all the remaining joints, but on the hind legs the metatarsi, the first, second, third and sometimes the fourth tarsal joints have minute white basal spots, not amounting to bands; on the mid legs the spots appear on the metatarsi, first and second tarsal joints, and on the fore legs there are minute yellowish spots at the tips of the tibiae, and base and apex of the metatarsi, the remaining joints being brown. Fore and mid ungues uniserrate.

Wings brown, with brown scales; cells rather short; the first submarginal a little longer and narrower than the 2nd posterior cell, the stem of each about two-thirds as long as the cells, the bases nearly in a line; the cross veins are all nearly the same length, mid and supernumerary meet, and the posterior cross-vein is distant about its own length from the mid; halteres have light stem and fuscous knob.

The male greatly resembles the female; the palpi are long, with golden brown plumes, and four narrow white bands; fore and mid ungues biserrate.

Length, 3.5–4 mm. Taken Aug. 15, 1905. Habitat, San Juan, Porto Rico.

Described from several specimens sent by Dr. L. G. de Queveda, Cont. Surg. U. S. A., which were taken at the Quarantine Station, Yellow Fever Hospital and Quarters; it at first glance suggests *C. taeniorhynchus* minus the hind legs, and probably lies near that, but is evidently distinct.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES NIGER:

Female.—Proboscis rather long, slender, cylindrical, the labellæ conically tapered; vestiture black, a narrow white ring before the middle; setæ minute, black, those on the labellæ more prominently outstanding. Palpi short, rather

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stout, about one-fifth the length of the proboscis, black scaled, the tips white; setæ moderate, black. Antennæ with the distal joints longer than the basal ones, rugose, black, pilose; tori subspherical, with a cup-shaped apical excavation, luteous brown, some pale scales on inner side; hairs of whorls moderate, sparse, black. Clypeus elliptical, prominent, dark brown, nude. Eyes black. Occiput dark brown, broadly clothed with fine, narrow curved scales, shining yellowish centrally, rich brown laterally, cheeks clothed with broad, flat white scales, a patch of black ones above at ocular margin, numerous slender, upright black forked scales on the occiput; bristles moderate, dark brown, those projecting between eyes dense and pale.

Prothoracic lobes elliptical, remote dorsally, dark, clothed with narrow curved scales, bronzy brown above, white below, and black setæ. Mesonotum dark brown, clothed thickly and uniformly with narrow curved dark bronzy brown scales, lighter only about the antescutellar space and above roots of wings; bristles moderate, black. Scutellum trilobate, brown, clothed with brassy scales, each lobe with a group of brown setæ. Postnotum conical, prominent, luteous brown, nude. Pleuræ and coxæ dark brown, clothed with elliptical, flat, white scales and pale setæ.

Abdomen subcylindrical, flattened, posterior segments tapering, the cerci exserted; dorsal vestiture of black scales, each segment with a narrow basal band of dull yellowish white scales, a row of large, pure white patches along the sides medianly on the segments, somewhat larger posteriorly, the last two visible from a dorsal view; venter clothed with pale yellow and white scales sparsely intermixed with black ones, with subapical ill defined black segmental bands. Cerci black.

Wings rather broad, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell also shorter than its cell; basal cross-vein about its own length distant from anterior cross-vein; scales of the veins black, the outstanding ones broadly linear, a very slight thickening of the scales at base of third vein. Halteres pale.

Legs moderately slender; femora partly pale beneath, black scaled above, tips black; knees white; tibiæ black, under side partially whitish scaled, the stiff outstanding setæ black; tarsi black; each joint of hind tarsi with a very narrow white basal ring, nearly absent on the last; fore and mid legs with the first three joints narrowly white at base, last two joints wholly black. Claw formula, 1.1–1.1–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Male.—Proboscis straight, long and slender, with a narrow white ring before the middle. Palpi longer than proboscis, the last two joints slightly enlarged, a broad white ring at middle of long joint and narrower ones at bases of last two joints; end of long joint and the last two joints with long black and brown hairs. Antennæ plumose, the last two joints long and slender, pilose, rugose, black, the others short, brownish, with a narrow black ring at insertions of hair-whorls; hairs long, dense, black with a brownish tint. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells longer; vestiture scanty. Abdomen elongate, depressed, the pale segmental bands broader than in the female, the lateral spots small, nearly obsolete on proximal segments; lateral ciliation long, dense, pale brown. Tarsal white rings broader than in the female, particularly on last joint of hind tarsi. Claw formula, 2.1–1.1–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 30, fig. 204): Side-pieces over twice as long as wide, inner third divided by a slight groove, apical lobe absent, basal lobe small, conically

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prominent, densely setose. Clasp-filament large, rather strongly swollen mesially with a long terminal articulated spine. Harpes concave, elliptical, the inner margin thickened and revolute, the apex produced into a short stout point directed outward. Harpagones with a long columnar base minutely setose, bearing a long ligulate terminal filament which tapers to the tip and bears a short retrose branch above the middle. Unci obscure, forming a short stout basal cylinder. Basal appendages short, stout, with a number of setæ.

Larva, Stage IV (plate 122, fig. 423).—Head rounded, widest through eyes; antennæ moderate, uniform, slightly spinose, a small tuft before the middle; both pairs of dorsal head-hairs single, ante-antennal tufts multiple. Body with the skin pilose. Lateral comb of the eighth abdominal segment of about twenty scales in an irregular patch, each scale with a uniform fringe of spines. Air-tube short, less than twice as long as wide, the pecten of about fifteen evenly spaced stout teeth running beyond the middle, followed by a multiple hair-tuft. Anal segment short, with a narrow chitinous ring, spinose behind; dorsal tuft a long hair and tuft on each side; lateral hair single, small; ventral brush well developed, confined to the barred area. Anal gills small, equal, about as long as the width of the chitinous ring.

The larvæ live in brackish or fresh temporary pools near the sea. Dr. Dyar found them in immense numbers in some large ditches along a road, on the other side of which was the ocean. So far as known, the habits are identical with those of *Aëdes tæniorhynchus*.

Antilles and southern Florida.

Jamaica (M. Grabham); Santo Domingo, West Indies (A. Busck); Quarantine Station, San Juan, Porto Rico, August 15, 1905 (through C. S. Ludlow); Mariel, Cuba (J. R. Taylor, J. H. Pazos); Guantanamo Bay, Cuba, May 31, 1904 (A. C. H. Russell); Cabanas, Cuba, May 28 (Palmer and Riley); Havana, Cuba (J. R. Taylor); San Antonio de los Baños, Cuba (J. H. Pazos); Andros Island, Bahamas, June 26, 1903 (T. H. Coffin); Government Harbor, Bahamas, 1903 (T. H. Coffin); Nassau, New Providence, Bahamas, June 24, 1903 (T. H. Coffin); Tarpum Bay, Eleuthera, Bahamas (T. H. Coffin); Rum Cay, Bahamas (T. H. Coffin); Current Settlement, Eleuthera, Bahamas, May 7, 1903 (T. H. Coffin); Florida Keys (H. Byrd); Osprey, Florida, August 31, 1901 (S. G. Webb); Fort De Soto, Florida (through C. S. Ludlow); Estero, Florida, July, 1907 (J. B. Van Duzee); Tampa, Florida, March 18, 1905 (H. G. Dyar); New Smyrna, Florida, March 21, 1905 (Dyar and Caudell); Miami, Florida, March 12, 1905 (Dyar and Caudell); Palm Beach, Florida (H. G. Dyar); Biscayne Bay, Florida, (Mrs. A. T. Slosson); Knights Key, Florida, December 2, 1908 (W. H. Sligh); Key West, Florida, June 27, 1901 (C. N. Barney); Loggerhead Key, Dry Tortugas, June 19, 1910 (A. G. Mayer). Reported also from Isle of Pines (Pazos), Antigua (Giles) and St. Lucia (Theobald), West Indies.

This species differs from *Aëdes tæniorhynchus* chiefly in having the last hind tarsal joint largely black. The male genitalia and the larvæ do not differ. It is a very poorly defined species, perhaps better classed as a geographic race of *tæniorhynchus*. Some of the specimens from Florida have broader white rings on the tarsi and thus approach *tæniorhynchus*. Dr. Pazos describes the last hind tarsal joint as entirely white in Cuban specimens, but this is evidently an error as his figures show that joint black with a white basal ring.

AËDES FLETCHERI (Coquillett) Dyar & Knab.

Culex flavescens **Theobald (not Fabricius, not de Villers), Mon. Culic., 1, 410, 1901.**
Culex flavescens **Giles (not Fabricius, not de Villers), Gnats or Mosq., 2 ed., 419, 1902.**
Culex fletcheri **Coquillett, Proc. U. S. Nat. Mus., xxv, 84, 1902.**
Culex arcanus **Blanchard, Les Moustiques, 303, 1904.**
Ochlerotatus fletcheri **Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 20, 1906.**

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Aëdes fletcheri Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 11, 1907.
Aëdes fletcheri Knab, Smiths. Misc. Colls., quart. iss., I, 544, 1908.
Culicada arcanus Theobald, Mon. Culic., v, 301, 1910.
Culex fletcheri Theobald, Mon. Culic., v, 485, 1910.
Culex arcanum Theobald, Mon. Culic., v, 485, 1910.

ORIGINAL DESCRIPTION OF CULEX FLAVESCENS:

Thorax golden scaled; abdomen entirely covered with ochraceous scales; legs brown, with the tarsi and metatarsi very broadly basally banded, pale ochraceous.

♀. Head densely covered with narrow golden-yellow curved scales, upright brown and black forked scales; antennae yellowish at the base, brown apically, basal joint bright ochraceous; palpi ochraceous with brown scales; proboscis unbanded.

Thorax brown, densely covered with curved hair-like golden scales; scutellum brown, with narrow curved pale golden scales, the mid lobe with several rows of long golden-brown bristles; metanotum chestnut-brown; pleurae ochraceous.

Abdomen densely clothed with ochraceous scales, with a few black ones dotted about in one specimen; coxae ochraceous; femora ochraceous; tibiae pale brown; metatarsi very pale ochraceous and also the tarsi, with black apices, giving them a broadly basally pale banded appearance.

Wings scaled much as in *C. pipiens*, first sub-marginal cell longer and narrower than the second posterior cell, the bases of the two fork-cells nearly level; second posterior cell rather short and broad; posterior cross-vein not quite its own length distant from the mid cross-vein; stem of the first sub-marginal cell not quite as long as the cell, stem of the second posterior cell as long as the cell.

Ungues of the fore and mid legs thick, uniserrated, equal.

Length.—6 mm.

Habitat.—Unknown.

Observations.—Described from four old specimens in the Hope Collection at Oxford. Three were named *Culex lutescens*, one *Culex flavescens*. There are no data attached. They are certainly not *C. lutescens*, Fabr., for the tarsi are banded, whilst in *C. lutescens* the tarsi are brown. They resemble in form *C. cantans*, but the abdomen is densely clothed with ochraceous scales, and the metatarsi and tarsi are really pale ochraceous with narrow black apical bands.

ORIGINAL DESCRIPTION OF CULEX FLETCHERI:

Head black, scales of occiput narrow, golden brown, on each side a patch of broad, appressed yellow ones, antennae brown, the first joint and bases of the second and third yellow, palpi yellowish brown, proboscis black, the median portion brown; body black, metanotum brownish yellow, scales of thorax golden brown, the bristly hairs and those on the scutellum golden yellow, abdomen wholly covered with pale yellow scales; femora yellow, the apices and tibiae blackish, the scales mixed white, yellow and black, not forming distinct bands; tarsi black, the bases yellowish brown, a band of white scales at bases of the three median joints on the front and middle tarsi, of the last four joints of the hind ones, claws very large, toothed; wings hyaline, veins yellow, scales sparse, small, those near base of wings chiefly yellowish, the others brown, the lateral ones on first four veins and upper branch of the fifth very narrow and elongate, petiole of first submarginal cell about half the length of that cell, crossvein at apex of second basal cell about its length from the one above it; halteres yellow, the knobs brown; length, 6 mm. Two females collected by Dr. James Fletcher, for whom this unique species is named.

Habitat.—Carnduff, Assiniboia, British America.

Type.—Cat. No. 6255, U. S. N. M.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES FLETCHERI:

Female.—Proboscis moderate, subcylindrical, flattened, uniform; vestiture of brown-black scales with a few pale ochreous ones intermixed, the labellæ black; setæ minute, black, curved, those on the labellæ more prominently outstanding. Palpi stout, rather long, more than one-fourth as long as the proboscis; vestiture of black scales with a few pale ones; setæ few and long, black. Antennæ with the joints subequal, rugose, pilose, black, second joint somewhat thickened, yellow; tori subspherical, with a cup-shaped apical excavation, ocher yellow, on the inner side black and with small, flat, broad whitish scales. Clypeus shortly conical, prominent, convex, black, nude. Eyes black. Occiput rather broad, clothed very broadly with dense, narrow, curved, brassy scales on the vertex, a large patch of golden brown ones on each side close to the eyes; cheeks narrow,

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clothed with broad, flat, pale ocherous scales, a small patch of black ones above at eye-margin; bristles along margins of eyes pale brown, a dense tuft of brassy ones projecting between the eyes.

Prothoracic lobes elliptical, well separated, brownish, clothed with narrow, golden scales below, golden-brown ones above and pale bristles. Mesonotum black, a broad median stripe of narrow curved golden-brown scales, a detached stripe of similar scales on each side on posterior half, sides of disk and antescutellar space clothed with pale brassy scales; bristles moderate, black, those posteriorly and at the roots of the wings yellowish white. Scutellum trilobate, brownish, clothed with small, narrow, curved, pale brassy scales, each lobe with a large group of whitish bristles. Postnotum broadly elliptical, convex, ocherous, pruinose, nude. Pleuræ gray, the coxæ pale brown, clothed with narrow, elliptical, flat, dull yellowish white scales and short pale bristles, the prothoracic epimera clothed with narrow golden brown scales.

Abdomen subcylindrical, flattened, the posterior segments tapered; dorsal vestiture nearly wholly of dull ocherous white scales intermixed with a few black ones, these latter predominating along lateral margins, forming an ill-defined stripe becoming obsolete towards the tip; venter similarly colored, the black scales forming an ill-defined median longitudinal stripe. Cerci black.

Wings rather broad, hyaline; petiole of second marginal cell nearly half as long as its cell, that of second posterior cell about as long as its cell; basal cross-vein nearly its own length distant from anterior cross-vein, scales of the veins black and yellowish white intermixed, the yellow largely predominating on the basal two-thirds of the costa, subcosta and first vein, the black predominating on third vein, the forks of the fourth and fifth veins and the whole of the sixth vein; outstanding scales linear to ligulate, very long, both black and pale. Halteres pale, with blackish, white-scaled knobs.

Legs rather long, clothed with pale ochraceous scales, the long outstanding setæ black; femora with some black scales on upper side which predominate towards tip; tibiæ similarly colored; first tarsal joint clothed with ochraceous scales with black ones intermixed which predominate at tips, the other joints black with basal white rings, the hind tarsi having the basal halves white, the rings narrower on the other legs and nearly obsolete on the last joint of front legs. Claw formula, 1.1–1.1–1.1.

Length: Body about 7.5 mm.; wing, 6.25 mm.

Male.—Proboscis slender, nearly straight. Palpi exceeding the proboscis by about half the length of the last joint; vestiture of ochreous and blackish scales, the latter very sparse, tending to form rings near the false articulation of the long joint and at the apices of the other joints; apex of long joint and last two joints with long, dense golden and brownish hairs. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, black at the thickened insertions of the hair-whorls; hairs long, dense, brown, shining. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture sparse. Abdomen long, depressed; dorsal vestiture of sordid yellowish white scales, with an ill defined, narrow median stripe of black and golden brown scales; lateral ciliation long, fine and dense, pale yellowish. Claw formula, 2.1–1.1–1.1.

Length: Body 7 mm.; wing 5.5 mm.

Genitalia (plate 25, fig. 176): Side-pieces nearly three times as long as wide, the tips conically rounded. Distal lobe large, prominent, conical, with short setæ. Basal lobe a rather large but slightly elevated area bearing numerous dense short setæ with tubercular bases; a stout spine with hooked tip within the basal lobe, accompanied by two slender hairs. Clasp-filament slender, attenuated above base, a long stout articulated spine at apex, nearly one-third as long as

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filament; three small setæ subapically. Harpes elliptical, edges recurved and thickened, tips pointed and directed outward. Harpagones with stout base tapering outwardly, minutely hirsute, bearing at its tip an articulated filament which widens, broadly lanceolate, with a short, somewhat recurved branch on inner side near middle. Unci invisible. Basal appendages small, rather approximate, bearing about six stout setæ.

Larva, Stage IV (plate 117, fig. 403).—Head rounded, widest through the eyes, sloping regularly to the front; antennæ slender, uniform, finely spined, the hair tuft at the middle; both pairs of dorsal head-hairs rather long, in threes, ante-antennal tufts multiple. Skin of body smooth. Lateral hairs in twos on second to sixth abdominal segments. Lateral comb of eighth abdominal segment of about twenty-five scales in a triangular patch, each scale fringed on the sides and with a long apical spine. Air-tube stout, less than four times as long as wide, slightly tapering outwardly; some fine hairs on dorsal surface towards base; pecten fine and dense, reaching nearly to middle of tube, the last two teeth detached; followed by a multiple hair-tuft. Anal segment longer than wide, with a large dorsal plate, reaching well down the sides; dorsal tuft a long hair and tuft on each side; lateral hair small, single; ventral brush large and abundant, with small tufts preceding the barred area nearly to the base of segment. Anal gills long, pointed, equal.

The larvæ inhabit ground-pools early in spring. There is a single annual generation. These larvæ develop rather slowly, and consequently inhabit water of a more permanent character than do those of the other species developing in snow-water. Mr. Knab says:

"Larvæ of this species in the second stage were found on May 19. They frequented the larger ditches and pools and appeared to be absent from most of the small pools, which dry out in a few weeks and form the favorite habitat of the larvæ of *A. spenceri*. Although next in importance to *A. spenceri*, this species is very much less numerous. The larvæ develop more slowly, and most of them do not reach maturity until after the larvæ of *A. spenceri* have disappeared. They seemed to thrive best in the deeper reedy pools of a more or less permanent character, where they feed near the bottom, ascending for air from time to time. On May 25 the larvæ were still in the second and third stages, and it was not until May 28 that a larva in the last stage was obtained. June 10 the first pupa was found, and the larvæ were at that time nearly all in the last stage. June 13 pupæ were numerous, and by June 18 the larvæ had all disappeared and only a very few pupæ remained. On May 27 the larvæ, in the third stage, were found in ditches and in a permanent swamp which were so strongly alkaline that there was a white deposit along the margins. In the alkaline ditches pupæ and full-grown larvæ of *A. spenceri* and small larvæ of *A. curriei* were associated with the larvæ of *A. fletcheri*. The adults bite in the daytime and also toward evening."

Prairies of western Canada and north-western United States.

Winnipeg, Manitoba, June 22, 1907 (F. Knab); Regina, Saskatchewan, June 23, 1902 (J. Fletcher); Pine Creek, Saskatchewan, July 12, 1903 (J. Fletcher); Qu'Appelle, Saskatchewan, June 9, 1901 (J. Fletcher); Carnduff, Saskatchewan, May 28, 1901 (J. Fletcher); Oxbow, Saskatchewan, June, 1907 (F. Knab); Belonge Creek, Saskatchewan, July, 1907 (V. A. Armstrong); Olds, Alberta, July 15, 1901 (J. Fletcher); Mount Cheam, British Columbia, August 3, 1899 (J. Fletcher); Big Fork, Montana (Edith M. Ricker).

Theobald described *Culex flavescens* from an unknown locality; but as the name was preoccupied, Blanchard proposed a substitute. The description, however, agrees so well with our *Aëdes fletcheri*, that we venture to refer it to the synonymy of this species, although we have not examined the types.

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AËDES STIMULANS (Walker).

Culex stimulans Walker, Cat. Dipt. Brit. Mus., i, 4, 1848.
Culex stimulans Giles, Gnats or Mosq., 245, 1900.
Culex stimulans Theobald (in part), Mon. Culic., i, 399, 1901.
Culex cantans Theobald (in part, not Meigen), Mon. Culic., i, 401, 1901.
Culex cantans Smith (not Meigen), Ent. News, xiii, 300, pl. xv, f. 3, 1902.
Culex cantans Giles (in part, not Meigen), Gnats or Mosq., 2 ed., 244, 416, 1902.
Culex cantans Smith (not Meigen), Bull. 171, N. J. Agr. Exp. Stat., 24, 1904.
Culex cantans Dyar (not Meigen), Journ. N. Y. Ent. Soc., xii, 174, 1904.
Culex cantans Felt (not Meigen), Bull. 79, N. Y. State Mus., 284, 1904.
Culicada cantans Felt (not Meigen), Bull. 79, N. Y. State Mus., 391*b*, 1904.
Culex cantans Smith (not Meigen), N. J. Agr. Exp. Sta., Rept. Mosq., 240, 1905.
Culicada subcantans Felt, Bull. 97, N. Y. State Mus., 448, 474, 1905.
Aëdes subcantans Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 202, 1906.
Ochlerotatus subcantans Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 20, 1906.
Ochlerotatus subcantans Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 6, 1906.
Culicada subcantans Theobald, Mon. Culic., iv, 324, 1907.
Aëdes subcantans Knab, Smiths. Misc. Colls., quart. iss., 1, 547, 1908.
Culex (*Culicada*) *stimulans* Speiser, Schrft. d. Physik.-ökonom. Gesell. zu Königsberg i. Pr., xlix, 391, 1908.
Culicada subcantans Theobald, Mon. Culic., v, 297, 1910.
Culicada maculatus Theobald (in part, not Meigen), Mon. Culic., v, 296, 1910.
Aëdes subcantans Morse, Ann. Rept. N. J. State Mus., 1909, 718, 1910.
Culicada subcantans De Meijere, Tijdschr. v. Ent., liv, 146, 1911.

ORIGINAL DESCRIPTION OF CULEX STIMULANS:

Fem. *Fusco-rufus, capite thoraceque flavo hirtis, abdominis segmentis flavo-cinctis, pedibus fuscis, tarsis nigris, flavo-cinctis, alis limpidis.*

Body brownish red: head and chest clothed with yellow hairs: mouth and feelers dark brown: each segment of the abdomen with a band of yellow hairs on the fore border, and with a few longer yellow hairs on the hind border: thighs pale brown, with black tips; shanks darker brown; feet black, base of each joint pale yellow: wings colourless; veins tawny; poisers pale yellow, with tawny tips. Length of the body 2¼ lines; of the wings 5 lines.

a. Nova Scotia. From Lieut. Redman's collection.

ORIGINAL DESCRIPTION OF CULICADA SUBCANTANS:

Genitalia, male. Basal clasp segment stout, sides nearly parallel, tapering somewhat distally and with a well developed distal lobe. Terminal segment slender, slightly swollen near the middle and with a long, slender, apical spine. Claspette a slight basal lobe bearing a very long curved, chitinous spine and a few large setae. Harpes with the proximal portion stout, and at the basal third several large, internal spines; distal portion a very long, slender, halbert-like blade, with a slightly recurved, acute tip. Harpagones evenly rounded, terminating in a stout, recurved tooth and with several smaller teeth. Unci approximate, rather broad, apex acute. Setaceous lobes well developed and bearing numerous large, chitinous spines.

Female. Lobes stout, about four times as long as broad, gently rounded exteriorly to a rather broadly rounded apex bearing a number of stout setae. Ventral plate as broad as a lobe, extending slightly beyond the basal third; apically, strongly emarginate and with a slightly sinuate lateral margin.

The following is an abstract of the table:

aa. Air-tube moderate in length, from about two to four times longer than its greatest diameter.
bbbbb. Air tube with pecten, more or less tapering; comb scales present.
cc. Seventh abdominal segment without dorsal plate.
ddd. Comb scales 25 or more.
ff. Pecten not as above (*i. e.*, pale, prolonged into setæ).
gg. Tuft of antennae normal.
hh. Comb scales each with a stout apical spine, broadly spatulate at base.
i. Air tube about three times as long as its greatest diameter; antennae moderately long with a slight swelling near the base, 25–50 comb scales and 16–24 pecten; head immaculate....Brown wood mosquito, *Culicada subcantans*

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DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES STIMULANS:

Female.—Proboscis moderate, subcylindrical, flattened, the labellæ conically tapered; vestiture brownish-black intermixed with sordid-white scales, especially beneath; setæ minute, curved, black, those on the labellæ more prominently outstanding. Palpi stout, short, about one-fourth as long as the proboscis, clothed with black scales, the bases of the joints with yellowish-white scales; setæ moderate, black. Antennæ with the basal joints somewhat shorter than distal ones, second joint larger and thicker and pale at base, the remaining joints rugose, blackish, pilose; tori subspherical, with a cup-shaped apical excavation, luteous, brown and with a patch of small white scales on the inner side; hairs of the whorls sparse, black. Clypeus convex, shortly conical, brownish, nude. Eyes black. Occiput blackish, broadly clothed with narrow, curved, dull yellowish white scales, many slender, erect, forked, black scales on the nape; cheeks clothed with flat, dull white scales, a small patch of black ones well up the sides near eye-margin; bristles bordering the eyes black, a tuft of pale ones projecting forward between the eyes.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with dull whitish scales and black bristles. Mesonotum dark brown, clothed with narrow, curved scales, rich bronzy brown on the disk, the anterior and lateral margins, the antescutellar space, and a subdorsal line on either side of it of sordid silvery scales; bristles moderate, black. Scutellum trilobate, luteous, each lobe with a group of black bristles and with vestiture of pale sordid yellow-silvery scales. Postnotum elliptical, prominent, luteous, pruinose, nude. Pleuræ and coxæ pale brown, clothed with flat, elliptical, white scales and rows of short pale bristles.

Abdomen subcylindrical, flattened, the posterior segments tapering; dorsal vestiture of black scales with a few pale ones intermixed, each segment with a broad basal medianly produced band of sordid creamy white scales, on the sides the bands widen into large triangular spots, dorsally visible on fourth, fifth and sixth segments; first segment with a patch of white scales and with many pale hairs; venter clothed with sordid white scales with a few black ones intermixed, sometimes forming a series of median spots. Cerci black.

Wings rather broad, hyaline; petiole of second marginal cell somewhat shorter than its cell, that of second posterior cell of about the same length as its cell; basal cross-vein about its own length distant from anterior cross-vein; scales of veins black with dull white ones intermixed, rather evenly distributed, the white scales predominant only on the subcostal vein, the black ones elsewhere; outstanding scales long, broadly linear with blunt tips, blackish; fringe dusky. Halteres entirely pale.

Legs moderately slender; femora clothed with dull creamy scales below, black and whitish ones about evenly intermixed above, the tips narrowly pale; tibiæ with black and whitish scales intermixed, the black ones predominating at apices, the stiff outstanding setæ mostly black; tarsi black, on hind tarsi each joint with a broad basal ring of white scales, the first joint with some white scales scattered over the surface; on the front and middle tarsi the bands are narrow, the last two joints of front tarsi and the last of the middle ones wholly black. Claw formula, 1.1–1.1–1.1.

Length: Body about 5 mm.; wing 4.5 mm.

Male.—Proboscis slender and straight. Palpi exceeding the proboscis by nearly the length of the last joint; end of long joint and last two joints somewhat thickened and bearing many long brown hairs with some black and dull yellow ones intermixed; long joint clothed with black and whitish scales, with a broad pale median ring, the last two joints broadly pale scaled at base. Antennæ

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plumose, the last two joints long and slender, black, rugose, pilose, the others short, largely black; hairs of whorls long, dense, black and yellowish-brown. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells longer; vestiture sparse. Abdomen long, depressed; segmental white bands much broader than in the female, the last two segments nearly all white scaled above; lateral ciliation long, abundant and fine, pale yellowish brown. Claw formula, 1.1–1.1–1.1.

Length: Body about 5 mm.; wing 4 mm.

Genitalia (plate 25, fig. 175): Side-pieces over twice as long as wide, slender; distal lobe roundedly prominent, continued along the inner margin narrowly toward the basal lobe; basal lobe quadrately expanded, bearing many small setæ with tuberculate bases and a stout double spine. Clasp-filament slender, bearing a few small setæ outwardly, at tip a long articulated terminal spine. Harpes slender, concave, inner margins revolute, hooked at tip, point directed outward. Harpagones with a stout cylindrical base, curved, minutely pilose, bearing a terminal filament, which is slightly expanded beyond middle. Unci approximate, revolute, forming an indistinct basal cylinder. Basal appendages stout and approximate, bearing a row of stout setæ at the tip.

Larva, Stage IV (see the figure of the entire larva, plate 63).—Head rounded, wider than long, sides slightly narrowed before eyes, a slight notch at insertion of antennæ, front margin broadly arcuate. Antennæ moderate, subcylindrical, slightly wider at base, spined all over; tuft moderate, very near middle, four terminal spines of different lengths and a blunt digit at tip. Upper pair of dorsal head-hairs single, lower double; ante-antennal tuft multiple, short. Mental plate long, triangular; thirteen side teeth, subequal, the end tooth not larger, the basal one detached and smaller. Mandible quadrangular, two filaments near tip and an outer row of cilia; ten filaments on outer edge; dentition of four teeth not much raised, the first the largest, preceded by a single large curved tooth; a broad serrate filament and six hairs within; process below furcate, with hair in patches; the lower angle forms another process from the base of the first, with a curved tip pointed at one end; six scattered hairs within; six stout hairs at base. Maxilla hemispherical, the tip crater-shaped, divided by a suture; inner half with the hairs on margin erected; a crown of hairs at tip; outer half with two filaments and a spine on other sides; palpus broadly attached, constricted at tip, with four small digits. Thorax rounded, wider than long; hairs abundant but not long; prothoracic hairs single and double; large fan-shaped tufts on meso- and meta-thorax. Abdomen rather stout, the anterior segments scarcely shorter; hairs moderate, the laterals double to sixth segment. Tracheal tubes broad, band-shaped, slightly widened in the segments. Air-tube stout, slightly tapered on the apical half, about three and a half times as long as basal width; pecten teeth dense, evenly spaced, occupying basal third, the single tooth a long spine, wide at base, with seven irregular basal branches; a single hair-tuft of four hairs beyond pecten, before middle of tube. Lateral comb of eighth segment of numerous scales in a triangular patch; single scale elliptical, fringed with long fine spines, a long smooth spine at tip. Anal segment nearly twice as long as wide, the dorsal plate reaching below middle of sides, roundedly incised in middle of lateral margin; dorsal tufts a long hair and a tuft on each side; a single lateral hair on plate; ventral brush well developed, preceded by small tufts nearly to the base. Anal gills moderate, about as long as the anal segment, tapered to a rather sharp point.

The larvæ inhabit temporary pools early in the spring. There is but a single generation in the year. The adults emerge early in the season, but the females live for as much as three months, frequenting forests. They come readily to bite by day, but do not frequent houses. The pools preferred by the larvæ are

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those along the banks of streams caused by overflows of high water, and are often full of mud and leaves. They also inhabit general woods-pools, but seldom occur so abundantly in such places. The open, often alga-filled pools, frequented by *Aëdes abfitchii* and *fitchii*, are not favored by this species. In Newark, New Jersey, Professor Smith records larvæ collected in March and April, the first adult April 6. At Morristown, a more wooded locality, the first adults appeared May 3. Mr. Brakeley did not find the species at Lahaway, nor does it occur anywhere in the pine belt to Professor Smith's knowledge. The larvæ generally occurred associated with *Aëdes canadensis*, which predominated, as would be expected in woodland pools, where the collections were made. Professor Smith remarks that the larvæ favor the deeper pools and feed and hide among the dead leaves covering the bottom. Professor Smith informed us that he has observed a partial rotation of species in certain pools that he had yearly under observation. In some seasons this species has occurred rarely in the pools, but other species in abundance, while in other years the proportions are reversed.

Northeastern North America.

West Springfield, Massachusetts, larvæ April 13, 1905 (F. Knab); foot of Mount Holyoke, Massachusetts, larvæ April 15, 1905 (Dyar and Knab); Plattsburg, New York, larvæ April 24, 1905 (H. G. Dyar); Oxbow, Saskatchewan, larvæ June 7, 1907 (F. Knab). Also reported from New Jersey (Smith) and originally from Nova Scotia (Walker).

We are able to cite only those localities where this species has been bred, as the female adults are indistinguishable from those of *abfitchii* and *fitchii*. The male genitalia serve for diagnosis, but males are seldom taken, unless bred, and in the latter case the species is distinguishable also by the larvæ. Unquestionably we have here three good species formerly considered identical, as they differ obviously in the structures of the larvæ and the male genitalia. But it is unfortunate that the females of the three species are so far not differentiable. Mr. Theobald has apparently separated them, and gives figures illustrating the differences in thoracic ornamentation which he has found in single specimens of the three species, furnished by us for comparison with Walker's types. His differentiation, made upon such slight material, disregards the variation which occurs and which vitiates the characters which he adduces. The specimens were sent to him for purpose of comparison, and not as representing the species in their range of variation. We have series of the three species, bred from carefully identified larvæ, which show such a range of variation in each species that no coloration character can be considered as diagnostic. *Aëdes stimulans* does not seem to be represented in the far West by an allied form, as *abfitchii* is. Walker's *stimulans* is unrecognizable, being based upon adults only, and may represent still another, as yet unrecognized species. Dyar applied the name to *abfitchii*, as the most abundant and widely distributed species of the group, but Speiser's previous restriction of *stimulans* to the present form must be followed. *Culex stimulans* has been reported from Vera Cruz, Mexico, by Parker, Beyer and Pothier (Yellow Fever Inst., U. S. Publ. Health & Marine Hosp. Serv., Bull. 13, 37, 39, 1903), but we are sure that a misidentification has been made; most likely the specimens were actually *Aëdes tæniorhynchus* or rubbed *Aëdes calopus*.

AËDES FITCHII (Felt & Young) Dyar & Knab.

Culex cantans Johannsen (not Meigen), Bull. 68, N. Y. State Mus., 419, 1903.
Culex cantans (no. 2) Dyar & Knab (not Meigen), Proc. Ent. Soc. Wash., vi, 143, 1904.
Culex fitchii Felt & Young, Science, n. s., xx, 312, 1904.
Culex fitchii Felt, Bull. 79, N. Y. State Mus., 281, 1904.
Culicada fitchii Felt, Bull. 79, N. Y. State Mus., 391c, 1904.
Culex fitchii Dyar, Journ. N. Y. Ent. Soc., xii, 246, 1904.

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Culex fitchii Felt, Bull. 97, N. Y. State Mus., 451, 1905.
Culicada fitchii Felt, Bull. 97, N. Y. State Mus., 475, 1905.
Grabhamia fitchii Dyar, Journ. N. Y. Ent. Soc., xiii, 186, 1905.
Aëdes fitchii Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 199, 1906.
Ochlerotatus fitchii Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 20, 1906.
Ochlerotatus fitchii Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 5, 1906.
Culicada fitchii Theobald, Mon. Culic., iv, 321, 1907.
Aëdes fitchii Knab, Smiths. Misc. Colls., quart. iss., i, 545, 1908.
Culicada fitchii Theobald, Mon. Culic., v, 299, 1910.
Aëdes fitchii Morse, Ann. Rept. N. J. State Mus., 1909, 718, 1910.

ORIGINAL DESCRIPTION OF CULEX FITCHII:

A long-tubed larva with a comb consisting of about eighteen triangular, stout, spined scales arranged in two or more rows, some of the scales having a very stout, terminal spine with smaller ones along each side, while others have the tips somewhat rounded and the spines more nearly of a size, was taken in a woodland pool at Karner, on May 10, adults emerging on the sixteenth. The air tube is fully five times as long as its greatest diameter, tapering somewhat regularly and with a slight bend and contraction near the middle. There are two rows of pecten, each consisting of about twenty-two closely-set teeth bearing at their bases usually two larger and three or four fine serrations. This species, *Culex fitchii* n. sp., is close to *Culex squamiger* Coq., and may be separated therefrom by the scales of the pleura being white and the posterior cross vein its own length from the one above. The basal segments of the antennae are clothed interiorly with broad white scales; proboscis dark-brown, long; palpi dark brown, segments narrowly ringed at the base with white; occiput clothed with brown scales, with a row of silvery ones just above the eyes and along the median line. Thorax with a broad, brown, central stripe bordered with a rather well-defined silvery, slightly broader, lateral stripe containing a few brown blotches. Pleura rather thickly clothed with patches of silvery white scales.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES FITCHII:

Female.—Proboscis moderately long and slender, subcylindrical, flattened, the labellæ conically tapered; vestiture brownish black with a few whitish scales intermixed; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi rather stout, short, less than one-fourth as long as the proboscis, clothed with black scales, tips and bases of joints with yellowish-white scales; setæ moderate, black. Antennæ with the basal joints somewhat shorter than the distal ones, second joint larger and thicker and pale at base, the remaining joints rugose, blackish, pilose; tori subspherical, with a cup-shaped apical excavation, luteous, brown and with a patch of small white scales on inner side; hairs of whorls sparse, black. Clypeus shortly conical, prominent, nude. Eyes black. Occiput blackish, very broadly clothed with narrow, curved, yellowish white scales and laterally a diffused patch of brown ones, many slender erect forked black scales on nape; cheeks clothed with flat white scales, a quadrate patch of black ones above at eye-margin; bristles bordering the eyes black, a tuft of pale ones projecting forward at the vertex.

Prothoracic lobes elliptical, remote dorsally, blackish, clothed with pale yellow scales and black bristles. Mesonotum dark brown, clothed with narrow curved scales, a broad median stripe of golden brown ones, anterior margin narrowly and the whole of the sides of the disk as well as the antescutellar area with pale sordid-yellowish ones, extreme lateral margins golden brown scaled; sides of disk with more or less of brown scales intermixed; bristles moderate, black. Scutellum trilobate, luteous, each lobe with a group of black bristles and clothed with narrow, curved, pale yellowish scales. Postnotum elliptical, short, luteous, pruinose, nude. Pleuræ and coxæ pale brown, clothed with elliptical white scales and rows of short pale bristles; prothoracic epimera with golden brown scales.

Abdomen subcylindrical, flattened, posterior segments tapering; dorsal vestiture of black scales with a few pale ones intermixed, each segment with a broad,

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medianly produced basal band of creamy or white scales and a narrow line of pale ones at tip, on the sides the bands widen into wide triangular spots, especially on the sixth and seventh segments; first segment with a large patch of white scales and many pale hairs; venter clothed with pale ocherous scales with some black ones intermixed, occasionally forming an imperfect median longitudinal stripe. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell somewhat shorter than its cell, that of second posterior cell about as long as its cell; basal cross-vein less than its own length distant from anterior cross-vein; scales of the veins black with white ones intermixed, rather evenly distributed, the white predominating on the subcostal vein, the black scales elsewhere; outstanding scales long, broadly linear with blunt tips. Halteres entirely pale.

Legs moderately long and slender; femora clothed with pale yellow scales below, black and whitish ones about evenly intermixed above, the tips narrowly pale; tibiæ with black and whitish scales intermixed, the black ones predominating at apices, the stiff outstanding setæ mostly black; tarsi black, each joint of hind ones with a broad basal ring of white scales, the first joint with some white scales scattered over the surface; on the front and middle tarsi the bands are narrow, the last two joints of the front tarsi and the last joint of the mid being wholly black. Claw formula, 1.1–1.1–1.1.

Length: Body about 5 mm.; wing 4.5 mm.

Male.—Proboscis slender, straight. Palpi exceeding the proboscis by nearly the length of the last joint; end of long joint and last two joints somewhat thickened and bearing many long brown hairs with some yellow ones intermixed; long joint clothed with black and white scales, a band of whitish ones at the middle, bases of last two joints with many white scales. Antennæ plumose, the last two joints long and slender, black, rugose, pilose, the others short, pale, with thick black rings at insertions of hair-whorls; hairs of whorls long, dense, black and yellowish-brown. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells longer; vestiture sparse. Abdomen elongate, depressed, the basal segmental bands broader; lateral ciliation long, abundant, pale brown. Claw formula, 1.1–1.1–1.1.

Length: Body about 5 mm.; wing 4 mm.

Genitalia (plate 25, fig. 173): Side-pieces over twice as long as wide, slender, distal lobe roundedly prominent, continued along inner margin narrowly to basal lobe; basal lobe triangularly expanded, bearing many small setæ with tubercular bases and a single stout spine. Clasp-filament slender, bearing a few small setæ outwardly, at tip a long articulated terminal spine. Harpes slender, concave, inner margins revolute, hooked at tip, point directed outward. Harpagones with a slender cylindrical base, slightly curved, minutely pilose, bearing a short terminal filament which has a small point at base and curved pointed tip. Unci approximate, revolute, forming an indistinct basal cylinder. Basal appendages stout and approximate, bearing a row of stout setæ at tip.

Larva, Stage IV (see figure of the entire larva, plate 64).—Head rounded, wide behind, narrowed before eyes, slightly notched at insertion of antennæ, the front margin broadly arcuate. Antennæ clindrical, slender, rather densely spined throughout, the tuft moderately large, situated before middle; four unequal terminal spines, the two larger shortly subapical, a small digit. Eyes large, transverse, pointed. Both pairs of dorsal head-tufts and the ante-antennal tuft multiple. Mental plate triangular, with central tooth and ten on each side, becoming larger and more remote basally, the last two small and irregular. Mandible quadrangular, a few short spines at base; two filaments near tip; an outer row of cilia from a collar; eight filaments on outer edge; dentition of four teeth on a process, the first longest, a curved spine and large double tooth at base,

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a broad serrate filament and seven narrow ones within strongly developed; process below furcate, with patches of hair; basal angle moderate, four filamentous hairs within and a row at base. Maxilla ovate, oblique, divided by a band-shaped suture; inner half rather evenly hairy, a large tuft at tip; outer half with a band of hairs, two small filaments next the suture, a spine on the other side; palpus rather long, slightly constricted beyond the middle, with four terminal digits rather unequal in size. Thorax rounded, wider than long; hairs abundant, rather long, the subdorsal prothoracic ones longer than the head. Abdomen moderate, the posterior segments more elongate and less prominent on the sides; hairs long, lateral hairs multiple on first two segments, double on third to sixth, longer than air-tube; a series of long subventral and subdorsal double hairs on third to seventh segments. Tracheal tubes narrow, linear, strongly angled, especially in the seventh segment. Air-tube rather long and slender, over four times as long as wide; stout at base, tapering from basal fourth outwardly; pecten reaching nearly halfway, the teeth evenly and closely set; single tooth a long spine with wide base and four irregular basal branches; a large tuft at about middle of tube, beyond pecten. Lateral comb of eighth segment of many spines in a triangular patch; single spine elongate, fringed all around with spinules of which the apical one is a little stouter and longer than the subapical ones. Anal segment a little longer than wide, the dorsal plate reaching well down the sides, with a small lateral emargination; dorsal tuft a brush and hair on either side; a single long lateral hair; ventral brush well developed. Anal gills moderate, longer than the segment, tapered.

The larvæ occur in woodland-pools in the early spring, hatching from overwintering eggs. The development is rather slow, and they consequently prefer deeper and less temporary pools. The species occurs with *abfitchii*, and has the same habits. Both occur in woods-pools and we have found them frequent in sphagnum swamps, the edges of which were overflowed by the melting of the snow. Mr. Knab observed that in Saskatchewan the larvæ of this species were usually found associated with those of *A. fletcheri*, although they were usually present in still smaller numbers. They developed at the same time with *fletcheri* and their growth was equally slow. Mr. Knab has observed the mating habits and his account of them will be found quoted in volume i, page 131, in the general consideration of the mating habits of mosquitoes.

North-eastern North America to the Canadian prairies.

Dublin, New Hampshire (A. Busck); foot of Mount Holyoke, Massachusetts, larvæ, April 15, 1905 (Dyar and Knab); Longmeadow, Massachusetts, April 16, 1905 (Dyar and Knab); Springfield, Massachusetts, May 17, 1905 (F. Knab); Plattsburg, New York, larvæ, April 24, 1905 (H. G. Dyar); Saxeville, Wisconsin, May 22-29, 1909 (B. K. Miller); Elkhorn, Manitoba, June 10, 1907 (T. N. Willing); White River, Ontario, June 25, 1907 (F. Knab); Aweme, Manitoba, June 5, 1904 (N. Criddle); Winnipeg, Manitoba, June 22, 1907 (F. Knab); Oxbow, Saskatchewan, May and June, 1907 (F. Knab); Regina, Saskatchewan, June 10, 1904 (T. N. Willing).

Our records for *Aëdes fitchii* comprise only the bred specimens and males, as the females are indistinguishable from those of *abfitchii* and *stimulans*. Professor Smith has not found this species in New Jersey, and it is possible that it has a more northern distribution than its allies. The larvæ are undoubtedly harder to rear than those of either *abfitchii* or *stimulans*, which may account for the apparent rarity of the species.

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AËDES SANSONI Dyar & Knab.

Culex cantans Dyar (not Meigen), Proc. Ent. Soc. Wash., vi, 38, 1904.
Culex cantans Dyar (not Meigen), Journ. N. Y. Ent. Soc., xii, 36, 1904.
Aëdes vittatus Dyar (in part, not Theobald), Proc. U. S. Nat. Mus., xxxii, 126, 1907.
Aëdes sansoni Dyar & Knab, Can. Ent., xli, 102, 1909.

ORIGINAL DESCRIPTION OF AËDES SANSONI:

Closely allied to *Aëdes subcantans*, Felt, but larger and darker in colour, the scales of the wings entirely black, not intermixed brown and whitish on the costa, as they are in *A. subcantans*.

Five specimens, Banff, Alberta, Canada. Collected in the summer of 1908. (N. B. Sanson.)

Type No. 12195, U. S. National Museum.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES SANSONI:

Female.—Proboscis moderate, subcylindrical, flattened, the labellæ conically tapered; vestiture brownish black with a few whitish scales intermixed; setæ minute, curved, black, those on the labellæ more prominently outstanding. Palpi rather stout, short, about one-fourth as long as the proboscis, clothed with black scales, the tips and the bases of joints with yellowish-white scales; setæ moderate, black. Antennæ with the basal joints somewhat shorter than the distal ones, the second joint larger and thicker and pale at base, the remaining joints rugose, blackish, pilose; tori subspherical, with a cup-shaped apical excavation, luteous, darker and with a patch of small whites scales on inner side; hairs of whorls sparse, black. Clypeus shortly conical, prominent, nude. Eyes black. Occiput blackish, medianly broadly clothed with narrow, curved, white scales and many slender, erect, forked, black scales on the nape; cheeks clothed with flat white scales and a large quadrate patch of brown ones well up the sides; bristles bordering the eyes black, a tuft of pale ones projecting forward at the vertex.

Prothoracic lobes elliptical, remote dorsally, blackish, clothed with pale yellow scales and black bristles. Mesonotum dark brown, clothed with narrow curved scales, a broad median stripe of golden brown ones, the anterior margin narrowly and the whole of the sides of the disk as well as the antescutellar area with sordid white ones; bristles moderate, black. Scutellum trilobate, luteous, each lobe with a group of black bristles and clothed with narrow, curved, sordid white scales. Postnotum elliptical, short, luteous brown, pruinose, nude. Pleuræ and coxæ pale brown, clothed with elliptical white scales and rows of short pale bristles; prothoracic epimera white scaled.

Abdomen subcylindrical, flattened, posterior segments tapering; dorsal vestiture of black scales with a few pale ones intermixed, each segment with a basal band of creamy white scales, on the sides the bands widen into a wide triangular spot especially on the sixth and seventh segments; first segment with a patch of white scales and many pale hairs; venter clothed with dull white scales, with well defined, elongate, median spots of black ones and lateral apical black spots occasionally forming bands on posterior margins of the terminal segments. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell somewhat shorter than its cell, that of second posterior cell about as long as its cell; basal cross-vein less than its own length distant from anterior cross-vein; scales of the veins black, no white ones intermixed; outstanding scales long, broadly linear, with blunt tips. Halteres entirely pale.

Legs rather slender; femora clothed with white scales below, black and whitish ones about evenly intermixed above, the tips narrowly pale; tibiæ with black and whitish scales intermixed, the black ones predominating at apex, the white ones tending to form a line on outer side of hind pair, the stiff outstanding setæ

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mostly black; tarsi black, each joint but the last of hind legs with a broad basal ring of white scales, the first joint with some white scales scattered over the surface; on the front and middle tarsi the bands are narrow, the last two joints of the front tarsi and the last joint of the mid ones wholly black. Claw formula, 1.1–1.1–1.1.

Length: Body about 5 mm.; wing 4.5 mm.

Male.—Proboscis straight. Palpi exceeding the proboscis by about the length of the last joint; end of long joint and the last two joints somewhat thickened and bearing many long brown hairs; long joint clothed with black scales, pale at the middle, bases of last two joints with many white scales. Antennæ plumose, the last two joints long and slender, black, rugose, pilose, the others short, largely pale, the hairs of the whorls long, dense, brown with yellowish-brown luster. Coloration similar to the female. Wings much narrower than in the female, the stems of the fork-cells longer; vestiture sparse. Abdomen elongate, depressed, the basal segmental bands broader, with dense, long, yellowish lateral ciliation. Claw formula, 1.1–1.1–1.1.

Length: Body about 5 mm.; wing 4 mm.

Genitalia: Side-pieces three times as long as wide, rounded at tip; apical lobe developed, running as a narrow ridge to the slight expanded basal lobe, which is without a thick spine. Clasp-filament long, slender, uniform, with a long articulated terminal spine. Harpes elliptical, concave, revolute on margin, tip bent. Harpagones with a slender stem and long, slightly expanded terminal filament, nearly as long as stem. Unci forming a basal cylinder. Basal lobes slender, with long terminal spines.

Larva, Stage IV (plate 118, fig. 408).—Head rounded, widest through eyes; antennæ rather long, nearly uniform, spinulated, tuft rather small and before middle; upper pair of head-hairs double, lower pair single, ante-antennal tufts in fours. Lateral comb of eighth segment of about twenty-five scales in a patch, each scale with long central spine and fine lateral fringes. Air-tube about four times as long as wide, tapering considerably on outer half; pecten reaching to middle, the last two teeth detached, followed by a long four-haired tuft. Anal segment a little longer than wide, with a dorsal plate reaching well down the sides; dorsal tuft a long hair and tuft on each side; lateral hair small, single; ventral brush well developed, with tufts preceding the barred area. Anal gills longer than the segment, stout, tapering, equal.

The larvæ were obtained from eggs laid by a captured female, and their habits in nature are unknown. It is, however, entirely probable that they are the same as those of *abfitchii* and related forms. The adults fly in the woods long after the larvæ have all disappeared, and bite readily by day. They do not frequent houses.

Mountains of western Canada and the north-western United States.

Banff, Alberta (N. B. Sanson); Banff, Alberta, August 16 (R. P. Currie); Kaslo, British Columbia, June 22, July 2, 1903 (H. G. Dyar); Juliaetta, Idaho, April 21, 1899 (J. M. Aldrich); Eureka, California, May 22 to June 6, 1903 (H. S. Barber); Fieldbrook, California, May 26, 1903 (H. S. Barber).

Dyar and Knab described *sansoni* from Alberta, from large specimens in which there are no white scales on the wings nor on the last joint of the hind tarsi. We have been inclined to hold as distinct certain specimens from California which have a few white scales in the costal region of the wing and a very narrow white ring on the last joint of the hind tarsi. We find, however, specimens from the same locality marked like typical *sansoni* and others with only a minute patch of white scales at base beneath, on the last hind tarsal. We are therefore convinced that these all belong to one species. One female from Eureka, California, has an abundance of white scales on the subcostal vein, but is not other-

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wise distinguishable. We have made preparations of male genitalia from specimens representing the two colorational forms and they agree in every respect. We have one male from California and three from Idaho, but no larvæ from these localities. We have larvæ from British Columbia, but no male. It is therefore possible, although we think not probable, that there are two species involved. The species is allied to *Aëdes abfitchii* and represents that species in the West. The genitalia of these two forms are alike, and in view of the fact that the genitalia are usually diagnostic of species in this group, it might be preferable to classify *A. sansoni* as a subspecies of *A. abfitchii*.

AËDES ABFITCHII (Felt) Dyar & Knab.

Culex cantans (no. 1) Dyar & Knab (not Meigen), Proc. Ent. Soc. Wash., vi, 143, 1904.
Culex abfitchii Felt, Bull. 79, N. Y. State Mus., 381, 1904.
Culicada abfitchii Felt, Bull. 79, N. Y. State Mus., 391c, 1904.
Culex siphonalis Grossbeck, Can. Ent., xxxvi, 332, 1904.
Culex abfitchii Dyar, Journ. N. Y. Ent. Soc., xiii, 29, 1905.
Culicada abfitchii Felt, Bull. 97, N. Y. State Mus., 475, 1905.
Culex siphonalis Smith & Grossbeck, Psyche, xii, 16, 1905.
Grabhamia abfitchii Dyar, Journ. N. Y. Ent. Soc., xiii, 186, 1905.
Culex siphonalis Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 243, 1905.
Aëdes abfitchii Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 193, 1906.
Ochlerotatus abfitchii Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 20, 1906.
Ochlerotatus abfitchii Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 4, 1906.
Culicada abfitchii Theobald, Mon. Culic., iv, 328, 1907.
Culicada siphonalis Theobald, Mon. Culic., iv, 330, 1907.
Culex abfitchii Smith, Can. Ent., xxxix, 119, 1907.
Aëdes stimulans Dyar (not Speiser), Proc. Ent. Soc. Wash., xi, 149, 1909.
Culicada abfitchii Theobald, Mon. Culic., v, 296, 1910.
Aëdes abfitchii Morse, Ann. Rept. N. J. State Mus., 1909, 718, 1910.

ORIGINAL DESCRIPTION OF CULEX ABFITCHII:

Larvae of this species were taken in some numbers at Karner N. Y. in early May, in association with those of C. f i t c h i i, which latter they closely resemble in general form and structure but may be separated therefrom by the one or two isolated pecten teeth on the air tube, and by the large apical spine of the comb scales being from one half to two thirds the length of the entire structure. This is the larva which Messrs Dyar and Knab consider the normal form of Culex cantans Meig. (Ent. Soc. Wash. Proc. 6: 143). This species proved difficult to rear, though a number of larvæ were obtained.

ORIGINAL DESCRIPTION OF CULEX SIPHONALIS:

♀. Head brown, occiput covered with pale yellow scales; antennae brown, basal joint and two following ones testaceous; proboscis pale brown, with dark brown scales scattered over the surface, covering the apical fourth; palpi dark brown, with minute terminal joint oval in form, pointed at the apex and slightly spiny. Mesonotum covered with pale yellow and brown scales at the sides and with a median vitta wholly of brown scales, the pale yellow scales sometimes forming a narrow border to this vitta; scutellum brown, with yellowish-brown bristles on the posterior margin; metanotum evenly brown; pleura brown, clothed with patches of dirty white scales; halteres yellowish-white, black at the apex. Abdomen blackish-brown, with pale yellowish basal bands and extremely narrow apical ones on the posterior three segments, irregularly merging into the brown, becoming diffused at the sides until beneath are mixed brown and white scales, the latter predominating. Legs with coxae yellowish-white; femora with mixed black and white scales, wholly yellowish beneath and with a white dot at the knee; tibiae blackish-brown, sprinkled with whitish scales; tarsi black, except the first tarsal joint, this like the tibiae, narrowly white banded at the base in the anterior and mid feet, save the fifth joint in the anterior one, posterior feet broadly white banded basally; claws slender, uniserrated; wings hyaline, petiole of first submarginal cell about half as long as this cell. Length, 5 mm.

♂.—Palpi brownish, with a pale band in the centre of the basal joint and at the base of the two terminal joints. Claws all uniserrated. The bands of the abdomen very broad, mixed with brown scales and tending to cover the entire surface in the apical segments. Petiole of first submarginal cell almost as long as this cell. Length, 6 mm. Otherwise as in the female.

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This species closely resembles *Culex cantans*, but differs in the median thoracic stripe, the much more slender claws, its darker colour and smaller size. The larvæ are obviously different from those of *cantans*, possessing a very long anal siphon, which has suggested the name.

Described from two females and five males bred from larvæ collected at Livingston Park, New Jersey.

Types in the collection of the New Jersey Experiment Station.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES ABFITCHII:

Female.—Proboscis moderate, subcylindrical, flattened, the labellæ conically tapered; vestiture brownish-black with scattered pale scales, most abundant before the middle; setæ minute, curved, black, those on the labellæ more prominently outstanding. Palpi rather stout, short, about one-fourth as long as the proboscis, clothed with black scales, tips and bases of joints with yellowish-white scales; setæ moderate, black. Antennæ with the basal joints somewhat shorter than the distal ones, second joint larger and thicker and pale at the base, the remaining joints rugose, blackish, pilose; tori subspherical, with a cup-shaped apical excavation, luteous, brown and with a patch of small white scales on the inner side; hairs of whorls sparse, black. Clypeus shortly conical, prominent, nude. Eyes black. Occiput blackish, broadly clothed with narrow, curved, creamy white scales in the middle, a diffused patch of brown ones laterally, and many slender erect forked black scales on the vertex; cheeks clothed with flat white scales, a small quadrate patch of black ones well up the sides at eye-margin; bristles bordering the eyes black, a tuft of pale ones projecting forward between the eyes.

Prothoracic lobes elliptical, remote dorsally, blackish, clothed with pale yellow scales and black bristles. Mesonotum dark brown, clothed with narrow curved scales, a broad median stripe of golden brown ones, anterior margin narrowly and the whole of sides of disk as well as the antescutellar area with pale yellow ones; bristles moderate, black. Scutellum trilobate, luteous, each lobe with a group of black bristles and clothed with narrow, curved, pale yellow scales. Postnotum elliptical, short, luteous, pruinose, nude. Pleuræ and coxæ pale brown, clothed with elliptical white scales and rows of short pale bristles; prothoracic epimera clothed with narrow, curved, golden brown scales.

Abdomen subcylindrical, flattened, posterior segments tapering; dorsal vestiture of black scales with a few pale ones intermixed, each segment with a broad basal band of creamy white scales and a narrow row of pale scales at tip; on the sides the basal bands widen into large triangular spots, particularly on the sixth and seventh segments; first segment with a large patch of white scales and many pale ciliæ; venter clothed with creamy white scales and with median segmental spots of black ones tending to form a longitudinal stripe. Cerci black.

Wings moderate, hyaline; petiole of the second marginal cell somewhat shorter than its cell, that of second posterior cell about as long as its cell; basal cross-vein less than its own length distant from anterior cross-vein; scales of the veins black with white ones intermixed, rather evenly distributed, the dark ones predominating the white ones most conspicuous on the subcostal and first veins; outstanding scales long, broadly linear, with blunt tips. Halteres entirely pale.

Legs moderately slender; femora clothed with creamy scales below, black and whitish ones about evenly intermixed above, the tips narrowly white; tibiæ with black and whitish scales intermixed, the black ones predominating at the apex, the stiff outstanding setæ mostly black; tarsi black, each joint of hind legs with a broad basal ring of white scales, the first joint with many white scales scattered over the surface and tending to form lines; on the front and middle

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tarsi the basal bands are narrow and nearly obsolete on the last joints. Claw formula, 1.1–1.1–1.1.

Length: Body about 5 mm.; wing 4.5 mm.

Male.—Proboscis slender, straight. Palpi exceeding the proboscis by about the length of the last joint; end of long joint and the last two joints somewhat thickened and bearing many long dark brown hairs; long joint clothed with black scales and white ones intermixed, a broad white ring at middle and near base; last two joints with many white scales at their bases. Antennæ plumose, the last two joints long and slender, black, rugose, pilose, the others short, largely pale; hairs of whorls long, dense, black with yellowish brown luster. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells longer, vestiture sparse. Abdomen long, depressed, the basal segmental bands broader; lateral ciliation long and abundant, pale yellow. Claw formula, 1.1–1.1–1.1.

Length: Body about 5 mm.; wing 4 mm.

Genitalia (plate 25, figs. 171 and 172): Side-pieces over twice as long as wide, slender; distal lobe roundedly prominent, continued along the inner margin narrowly to the basal lobe; basal lobe quadrately expanded, bearing many small setæ with tubercular bases, but without a stout spine. Clasp-filament slender, bearing a few small setæ outwardly, at the tip a long articulated terminal spine. Harpes slender, concave, the inner margins revolute, hooked at the tip, the point directed outward. Harpagones with a slender cylindrical base, curved, minutely pilose, bearing a terminal filament which is nearly as long as the stem and angularly expanded at middle. Unci approximate, revolute, forming an indistinct basal cylinder. Basal appendages stout and approximate, bearing a row of stout setæ at the tip.

Larva, Stage IV (see the figure of the entire larva, plate 65).—Head broad, rounded, wide behind, abruptly narrowed before eyes, slightly notched at insertion of antennæ, front margin broadly arcuate. Antennæ subcylindrical, slender, a little thickened near base, spined all over and with a fine serration along inner side; tuft before middle, moderate; three short terminal spines, a longer one and a short broad digit. Eyes large, transverse, pointed. Both pairs of dorsal head-hairs double; ante-antennal tuft multiple. Mental plate triangular, an apical tooth and twelve on each side, the upper seven rounded and closely set, the rest pointed and more remote toward base, the last one small. Mandible quadrangular, with a patch of spines near base; two filaments near tip with a thorn-shaped basal process; an outer row of cilia from a collar; thirteen filaments on outer edge, those next the collar smaller and feathered; dentition of four teeth on a process, the first largest, the third next so; a filament before, a tooth with basal notch at base, a broad filament within; process below rather widely furcate, with large hair-tufts; basal angle blunt, seven scattered filamentous hairs within; a row at base. Maxilla elongate hemispherical, divided by a suture; inner half long-haired, a large tuft at tip; outer half with a patch of hair toward base, the filaments next the suture moderate; palpus short, with four small digits. Thorax rounded, wider than long; hairs abundant, rather long, the subdorsal prothoracic ones single and as long as the head. Abdomen moderate, anterior segments short, posterior ones narrow and elongate; hairs rather long, the lateral ones triple on first two segments, single on third to sixth; a pair of long subventral hairs on third to fifth segments and long subdorsal ones on fourth and fifth. Tracheal tubes rather narrow, but band-shaped, narrowed posteriorly, not markedly angled except in the eighth segment. Air-tube rather long and slender, stout at base, tapering from basal fourth outwardly, four or more times as long as wide; pecten reaching less than halfway, the last two teeth large and detached; single spine long, with wide base and four to six basal

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branches; a large tuft at middle of tube beyond pecten. Lateral comb of eighth segment of many scales in a triangular patch; single scales elliptical, fringed with long spinules, the terminal one much longer and stouter, as long as the body of scale. Anal segment about twice as long as wide, the dorsal plate reaching well down the sides, with a shallow lateral emargination; dorsal tuft a brush and hair on either side; a single long lateral hair; ventral brush well developed, long, with small tufts preceding the barred area toward base. Anal gills moderate, a little longer than the segment, tapered, bluntly pointed.

The larvæ appear in pools in the early spring, hatching from over-wintering eggs. There is but a single brood in the year. The habits, so far as known, are the same as those of *Aëdes fitchii*, the larvæ being of rather slow development and often found in pools of a more permanent nature. The adult females probably form part of those that linger in the forests until midsummer, and bite readily by day. These females will bite as long as they are able to fly, even after they have deposited all their eggs. They do not tend to enter houses, except perhaps when these are very close to trees, but in the woods are very troublesome.

Northeastern North America.

Dublin, New Hampshire (A. Busck); Springfield, Massachusetts, larvæ, May 11, 1905 (F. Knab); Longmeadow, Massachusetts, April 16, 1905 (Dyar and Knab); Plattsburg, New York, April 24, 1905 (H. G. Dyar); Saxeville, Wisconsin, May 22, 1909 (B. K. Miller); White River, Ontario, June 25, 1907 (F. Knab); New Brunswick, New Jersey (J. A. Grossbeck). Reported also from Karner, New York (Felt).

Only our breeding-records and those from males are given, as captured females can not be identified; the coloration varies in such a manner that specimens can not be distinguished from *fitchii* and *stimulans*. Mr. Knab did not take this species in Saskatchewan, but we think that is an accident only, for the species probably has the same range as the others. It is represented in the northwest by an allied form, *Aëdes sansoni*. We had intended following Dyar in applying Walker's name *stimulans* to this species, as it is the commonest of the three eastern species that are alike as adults and thus most probably the species Walker had before him when he published the name. However, Speiser had earlier referred the name to *subcantans* Felt, and as there is no means of proving to which species Walker's specimen really belongs, we are obliged to follow Speiser, as he has priority in restricting the name.

AËDES VITTATA (Theobald) Dyar.

Grabhamia vittata Theobald, Can. Ent., xxxv, 313, 1903.
Grabhamia vittata Blanchard, Les Moustiques, 397, 1905.
Ochlerotatus vittata Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 20, 1906.
Grabhamia vittata Theobald, Mon. Culic., iv, 306, 1907.
Aëdes vittatus Dyar (in part), Proc. U. S. Nat. Mus., xxxii, 126, 1907.
Grabhamia vittata Theobald, Mon. Culic., v, 284, 1910.

ORIGINAL DESCRIPTION OF GRABHAMIA VITTATA:

Thorax clothed with rich reddish-brown scales and with two narrow broken creamy lines and a few pale scales at the sides, especially over the roots of the wings; pleura with dense gray scales. Abdomen blackish-brown with basal white bands; venter white. Legs brown, base of femora pale, remainder of femora and tibiæ mottled with white scales; some of the tarsi with basal white bands; last hind tarsal black; ungues of ♀ all uniserrated; of ♂ all uniserrated.

♀.—Head brown with narrow curved yellowish scales, palest in the middle, with numerous upright yellow and black forked scales, flat creamy-white lateral scales with a round patch of flat black ones in the middle of each white area, a pale border along the eyes, black bristles projecting over them, except in the middle where the bristles are golden; antennæ deep brown, basal joint and base of the second joint bright testaceous; proboscis deep brown; palpi deep brown towards the apex; joints testaceous, with a few golden and black hairs, apical joint long, as long as the rest of the palpi. Thorax deep brown, clothed with bright reddish-brown narrow curved

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scales, a narrow median black line and a narrow line of creamy scales on each side, also a few creamy scales in front, over the root of the wings and before the scutellum; four rows of long dark bristles on the posterior half of the mesonotum; scutellum brown with narrow curved pale creamy scales and long dark posterior border bristles; metanotum pale brown; pleura fawn coloured, densely-white scaled.

Abdomen deep blackish-brown with basal white bands and a few yellow scales on the apices of the last three segments; border bristles pallid; venter densely clothed with creamy-white scales. Legs with the coxae pale, with creamy scales; femora pale basally and ventrally, with scattered brown scales becoming densest towards the apex, extreme apex with a yellow spot; tibiae brown, mottled with pale scales, darkest towards the apex and with black bristles; fore metatarsi and first two tarsal segments with narrow pale basal bands; mid-tarsi the same as the fore; hind legs with a pale basal band to the metatarsi and first three tarsal segments, last segment black; all the ungues uniserrated.

Wings with brown scales except on the subcostal vein and one side of the first long vein, where they are mainly white, and also at the base of the costa; the lateral vein-scales on the second, third, fourth and apex of the fifth veins long; the first, third and fifth long veins with darker scales than the remainder; fork-cells short, the first submarginal cell longer and narrower than the second posterior cell, its base about level with that of the latter, its stem slightly longer than half the length of the cell; stem of the second posterior about the same length as the cell; posterior cross-vein rather more than its own length distant from the mid cross-vein; fringe dense, brown. Halteres with pale testaceous stem and fuscous knot.

Length.—4.2 to 5.5 mm.

♂.—Palpi brown with a white band at the base of the two apical joints, plume-hairs brown, yellow opposite the pale basal areas, there is also a pale band on the long antepenultimate joint, the last two joints of nearly equal length, the apical one slightly the shorter; apex of the antepenultimate swollen. Antennae with brown plume hairs tipped with grayish yellow; scales of the head gray. Thorax with looser, more scattered, reddish-brown scales in the middle, gray ones at the sides. Abdomen as in the ♀. Legs banded as in the ♀, but the pale basal bands more of a yellow hue.

Fork-cells very small; first submarginal a little longer and much narrower than the second posterior, its base a little the nearer the apex of the wing, its stem a little longer than the cell; stem of the second posterior cell also longer than the cell; posterior cross-vein about one and a half times its own length distant from the mid.

Fore and mid ungues unequal, both uniserrated, the larger mid ungues rather straighter than the much-curved fore one; hind ungues equal, prominently uniserrated. Basal lobes of genitalia very hairy, claspers narrow, thin, terminating in a longish spine.

Length.—4.5 to 5 mm.

Habitat.—Pecos Canon, New Mexico, U. S. A.

Time of capture.—June 16th to 29th.

Observations.—A very abundant species, according to Dr. Grabham, caught after sunset. It varies very much in size, the smallest specimen being 4 mm., the largest 5.5 mm. The ♂ has evidently a variable adornment on the thorax and is peculiar in having the hind ungues uniserrated.

The species can easily be told from any other *Grabhamia* with banded legs by the basally-banded abdomen and last hind tarsal being black and the white-scaled subcostal and first long vein. *G. dorsalis*, which it most nearly approaches, has the abdomen and thorax with different adornment and the legs basally and apically banded, not basally as in this species. The type is in the British Museum (Nat. Hist.).

The *larva.*—Head deep chestnut brown, eyes black, reniform, pale around; antennae pale testaceous at the base, dark at the apex, terminating in two small spines and a third larger flattish pointed one, paler in colour; there is also a long lateral spine about half way down the antenna; mouth whorls bright golden-yellow; thorax and abdomen pale brown with a double darker dorsal line, the front of the thorax with four tufts of black hairs in the middle in front, then two separate hairs and then another tuft on each side, two pairs of long lateral tufts, the first pair with two single black bristles just behind them and a little more centrally placed; the first two abdominal segments with large lateral tufts, remainder with small ones; siphon short and thick, deep brown, about as long as the penultimate and antepenultimate segments; a few tufts of hair near its base and also a patch of characteristic spines. The last segment has a single dorsal tuft with a large bristle below it; the ventral fan rather long and prominent and four ventral small tufts.

Length.—When mature, 9 mm.

The *pupa* has cylindrical siphons contracted towards the apex, with small, slightly-oblique, opening; there is a dense median tuft on the first abdominal segment. The

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anal fins are large, rounded, with median rib and double-contoured border towards the base of each fin; a distinct apical dorsal tuft on the last segment.

Length.—5 mm., with anal fins 6 mm.

DESCRIPTION OF FEMALE OF AËDES VITTATA (LARVA UNKNOWN):

Female.—Proboscis moderately slender, subcylindrical, flattened, labellæ conically tapered; vestiture brownish-black; setæ minute, curved, black, those on the labellæ more prominently outstanding. Palpi rather stout, short, less than one-fourth as long as the proboscis, clothed with black scales, the tips and bases of the joints with yellowish-white scales; setæ moderate, black. Antennæ with the basal joints somewhat shorter than the distal ones, second joint larger and thicker and pale at base, the remaining joints rugose, blackish, pilose; tori subspherical, with a cup-shaped apical excavation, ocher yellow, dark brown on inner side; hairs of whorls sparse, black. Clypeus short, convex, conical, nude. Eyes black. Occiput blackish, broadly clothed with coarse, narrow, curved, pale-yellow scales, mixed with pale brownish ones at the sides, many erect, broad, truncate yellowish white scales on the nape, some slender, erect, forked brown scales toward the sides; cheeks and margins of eyes clothed with flat white scales, a patch of black ones well up the sides near eye-margin; bristles bordering eyes black, a tuft of pale ones projecting forward at vertex.

Prothoracic lobes elliptical, remote dorsally, blackish, clothed with pale yellow scales and black bristles. Mesonotum dark brown, clothed with narrow, curved golden-brown scales, the anterior and lateral margins narrowly and two narrow subdorsal lines as well as the antescutellar area of yellowish white scales; bristles moderate, black. Scutellum trilobate, luteous, each lobe with a group of black bristles and clothed with pale-yellow scales. Postnotum elliptical, short, luteous, pruinose, nude. Pleuræ and coxæ pale brown, clothed with elliptical white scales and rows of short, pale bristles; the scales on the prothoracic epimera are yellowish and narrow, like those on the margin of mesonotum.

Abdomen subcylindrical, flattened, the posterior segments tapering; dorsal vestiture of black scales, each segment with a rather broad basal band of creamy white scales; on the sides the bands widen into large triangular spots, particularly on the sixth and seventh segments; first segment with a large patch of white scales and many long, pale setæ; venter clothed with creamy white scales with some black ones intermixed medianly near the hind margins and on the posterior segments tending to form a longitudinal stripe. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell somewhat shorter than its cell, that of second posterior cell about the same length as its cell; basal cross-vein more than its own length distant from anterior cross-vein; scales of the veins black with a few pale ones intermixed, most conspicuous on the subcostal vein; outstanding scales long, broadly linear with blunt tips. Halteres entirely pale.

Legs moderately long, rather slender; femora clothed with creamy scales below, black and whitish ones about evenly intermixed above, tips narrowly pale; tibiæ with black and whitish scales intermixed, the white ones tending to form lines, the black ones predominating at apex, the stiff outstanding setæ black; tarsi black, first four joints of hind ones with a broad basal ring of white scales, first joint with some white scales scattered over the surface, last joint wholly black; on the front and middle tarsi the bands are narrow and the last joint is wholly black. Claw formula, 1.1–1.1–1.1.

Length: Body about 5 mm.; wing 4.5 mm.

We have no specimen of the male.

Life history and habits unknown.

New Mexico.

Pecos Canyon, June 25 (Grabham and Cockerell).

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The characters of the adult are variable and do not distinguish *Aëdes vittata* from its allies, *stimulans, fitchii, abfitchii* and *sansoni,* and we know neither male genitalia nor larvæ. We therefore hold the species tentatively on the locality solely. We have three specimens from the original lot from which Theobald obtained his type-material. One of them has the last joint of the hind tarsi all black, while another has it distinctly white marked; the third specimen is broken. The larvæ credited to this species by Theobald in connection with the original description do not belong to it and are obviously those of *Culiseta incidens.*

AËDES SYLVESTRIS (Theobald) Dyar & Knab.

Culex stimulans Cockerell (not Walker), Proc. Davenport Acad. Nat. Sci., vii, 150, 1898.
Culex stimulans Coquillett (not Walker), U. S. Dept. Agr., Div. Ent., Circ. 40, 2 ser., 5, 6, 1900.
Culex stimulans Howard (not Walker), U. S. Dept. Agr., Div. Ent., Bull. 25, n. s., 19, 20, 1900.
Culex stimulans Howard (not Walker), Mosquitoes, 81, 1901.
Culex sylvestris Theobald, Mon. Culic., i, 406, 1901.
Culex stimulans Graenicher (not Walker), Bull. Wisc. Nat. Hist. Soc., i, 33, 34, 1902.
Culex sylvestris Smith, Ent. News, xiii, 303, pl. xv, f. 10, 1902.
Culex sylvestris Dyar, Journ. N. Y. Ent. Soc., x, 196, 1902.
Culex sylvestris Dyar, Science, n. s., xvi, 672, 1902.
Culex sylvestris Dyar, Proc. Ent. Soc. Wash., v, 142, pl. ii, ff. 1–3, 1903.
Culex sylvestris Johannsen, Bull. 68, N. Y. State Mus., 421, 1903.
Culex sylvestris Smith, N. J. Agr. Exp. Stat., Bull. 171, 25, 1904.
Culex sylvestris Felt, Bull. 79, N. Y. State Mus., 289, 1904.
Ecculex sylvestris Felt, Bull. 79, N. Y. State Mus., 391c, 1904.
Culex sylvestris Dyar, Proc. Ent. Soc. Wash., vi, 39, 1904.
Culex sylvestris Britton & Viereck, Rept. Conn. Agr. Exp. Stat., 1904, 268, 272, 273, 1905.
Culex montcalmi Blanchard, Les Moustiques, 307, 1905.
Culex sylvestris Smith, N. J. Agr. Exp. Stat., Rept. Mosq., 248, 1905.
Ecculex sylvestris Felt, Bull. 97, N. Y. State Mus., 479, 1905.
Ecculex sylvestris Dyar, Proc. Ent. Soc. Wash., vii, 47, 1905.
Aëdes sylvestris Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 194, 1906.
Ochlerotatus sylvestris Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 20, 1906.
Ochlerotatus sylvestris Dyar, U. S. Dept. Agr. Bur. Ent., Circular 72, 4, 1906.
Culex sylvestris Theobald, Mon. Culic., iv, 405, 460, 1907.
Culex sylvestris Howard, Osler's Modern Medicine, i, 376, 1907.
Aëdes sylvestris Dyar, Proc. U. S. Nat. Mus., xxxii, 125, 1907.
Aëdes sylvestris Knab, Journ. N. Y. Ent. Soc., xv, 216, 1907.
Culex (Ochlerotatus) sylvestris Viereck, 1st Ann. Rept. Comm. Health Pa., 470, 1908.
Culex sylvestris Graenicher, Bull. Wisc. Nat. Hist. Soc., vii, 56, 57, 58, 1909.
Aëdes sylvestris Thibault, Proc. Ent. Soc. Wash., xii, 18, 1910.
Culex sylvestris Theobald, Mon. Culic., v, 347, 1910.
Aëdes sylvestris Morse, Ann. Rept. N. J. State Mus., 1909, 718, 1910.

ORIGINAL DESCRIPTION OF CULEX SYLVESTRIS:

Thorax deep brown, with thin golden scales, pale in front of the scutellum. Abdomen with dusky brown to black scales, with basal bands of pure white, bent in in the middle, last two segments with apical white bands as well. Legs brown and black, femora pale beneath and at the base, the metatarsi and some or all of the tarsi with narrow pale basal bands. Fore and mid ungues of the ♀ equal, uniserrated; hind equal, simple.

♀. Head dark brown, densely clothed in the middle with pale golden curved scales and numerous upright forked ochraceous ones in front, similar black ones behind; at the sides of the head is a patch of flat black, then flat white scales; antennae dark brown, basal joint dark testaceous, base of the second joint bright testaceous; palpi black scaled, the apex with white scales; clypeus dark brown; proboscis with very dark brown scales, becoming jet black at the tip.

Thorax deep brown, covered with thin curved hair-like golden scales, which become almost white in front of the scutellum, with four rows of black bristles and with a tuft of dark brown bristles over the roots of the wings; scutellum deep brown, with pale curved scales and with a complex row of median border-bristles; pleurae umber brown, with patches of white scales; metanotum chestnut-brown.

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Abdomen steely-black, covered with dusky deep purplish-black scales, the base of each segment with a band of pure white scales bent in at the middle, the last two segments with apical white bands, the penultimate one with apical and basal, the apical expanded in the middle; first segment deep ochraceous, with light and dark scales and three patches of pale hairs; posterior borders of the segments with short pale golden hairs; venter with broad basal white bands and narrow apical lateral ones, middle of the venter mostly white scaled.

Legs with the coxae pale ochraceous; femora white beneath and at the base, dark brown above towards the apex, knee spot pale yellowish; tibiae dark brown above, pale ochraceous beneath; metatarsi and tarsi black above, pale beneath, with narrow pale basal bands on all the joints in the hind legs, but not on the last two tarsi on the fore and mid legs; ungues of the fore and mid legs equal, each with a single tooth, those of the mid legs straighter than those of the fore, hind ones equal and simple.

Wings with brown scales, the lateral ones long and thin; first sub-marginal cell longer and a little narrower than the second posterior cell, about two and a half times the length of its stem, which is shorter than the stem of the second posterior cell, base of the first sub-marginal cell nearer the base of the wing than that of the second posterior cell, stem of the latter about two-thirds the length of the cell; posterior cross-vein about its own length distant from the mid cross-vein.

Halteres with pale stem and fuscous knob.

Length.—4.5 to 5 mm.

♂. Head dark brown, with pale golden curved scales over the crown, black upright forked ones behind, with flat white scales at the sides; eyes black and silvery; antennae banded, brown and dusky white, plumes silky brown; proboscis covered with black scales; palpi black scaled, the base of the third joint with a broad white band, its apex dilated, fourth also dilated, its base with a narrow ring of white scales, hair-tufts deep brown. Abdomen banded much as in the ♀, but much narrower, and the bands more contracted in the middle, so that it looks almost like two lateral spots, densely hairy, hairs pale golden; ♂ genitalia almost black. Ungues of the fore and mid legs unequal, the larger with a distinct tooth, and the smaller also with one at the base, hind ungues equal and simple.

Length.—4.5 mm.

Habitat.—Ontario, Canada (E. M. Walker) (66); Manitoba (W. I. Spencer) (19, 1, 1900).

Time of capture.—July and September.

Observations.—A very distinct species, easily told by the abdominal banding and the head ornamentation from any other mosquito I have seen. It is apparently a wood species. The specimens bear the following notes on the labels: "Rondeau Provincial Park, Kent Co., Ontario, from the interior of a sandy wood of white pine with a few hard woods"; "From grass and low herbs in a wood of sugar, maple, aspen, balsam and fir"; "From the interior of a wood of walnut, maple, hickory, oak, and many other hard woods." Another: "Taken at night in oak grove near Lake Simcoe." A single ♀ also received from Stony Mountain, Manitoba, has a small apical patch of white scales on the fourth segment.

DESCRIPTION OF FEMALE, MALE, LARVA, PUPA, AND EGG OF AËDES SYLVESTRIS:

Female.—Proboscis moderate, subcylindrical, the labellæ conically tapered; vestiture black with pale yellowish scales intermixed along the middle beneath; setæ minute, curved, black, those on the labellæ more prominently outstanding. Palpi short, somewhat club-shaped, about one-fifth as long as the proboscis, black scaled, the tips and bases of segments with white scales; setæ rather short, black. Antennæ with the distal joints longer than the basal ones, rugose, pilose, black; second joint thickened, pale at base; tori subspherical, with a cup-shaped apical excavation, pale yellow without, blackish within. Clypeus shortly conical, prominent, blackish-brown, nude. Eyes brownish black. Occiput blackish, broadly clothed with narrow curved scales, on the vertex pale ocherous and bronzy brown intermixed, black ones on the sides, many erect forked scales, some black, some pale; cheeks yellowish-white scaled, with a quadrate black patch above; setæ along the margins of the eyes black, a tuft of golden-yellow ones projecting between the eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with narrow pale yellow scales and black bristles. Mesonotum dark brown, uniformly clothed with small, narrow curved, bronzy brown scales, some paler ones around antescutellar

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area and over roots of wings. Scutellum trilobate, luteous, clothed with narrow pale scales, each lobe with a group of golden-brown bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ pale brown, coxæ yellowish, clothed with elliptical, flat, white scales in patches and rows of pale bristles; prothoracic epimera with brown scales similar to those on mesonotum.

Abdomen subcylindrical, flattened, the posterior segments tapering; dorsal vestiture dull black, a band of sordid-white scales at the base of each segment, nearly divided by a median excision, more markedly so on posterior segments, lateral margins of segments with an elongate patch of white scales reaching from near base close to apex and narrowly separated from the basal bands, some white scales at apical margins of sixth and seventh segments; first segment with a large patch of yellowish-white scales and with many pale hairs; venter clothed with yellowish-white scales, basally on the segments a median row of elongate black patches, sometimes joined with apical lateral marks into broad Y-shaped markings. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell much shorter than its cell, that of second posterior cell about equal to its cell; basal cross-vein about its own length distant from anterior cross-vein; scales of veins brownish black, those on costa and first vein with a blue reflection, the outstanding ones long and narrowly linear. Halteres whitish.

Legs moderately slender; femora with yellowish-white scales beneath and mostly black ones above, the extreme tips pale; tibiæ clothed with black and pale yellow scales intermixed, the latter predominating on the inner sides, a small pale spot at base; tarsi black, each joint of hind ones with a small yellowish white basal ring, the first joint with many yellowish scales on inner side; fore tarsi without rings on last two joints, mid tarsi without ring on last joint. Claw formula, 1.1–1.1–1.1, more rarely 1.1–1.1–1.0 or 1.1–1.1–0.0.

Length: Body about 5 mm.; wing 4.5 mm.

Male.—Proboscis straight, moderately long. Palpi exceeding the proboscis by about the length of the last joint, terminal joints slightly enlarged; vestiture black, a white ring at base of each of the last two joints and at middle of the long joint; end of long joint and the last two joints with many dense black and reddish brown hairs. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, white, with a broad black ring on the incrassated insertions of the hair-whorls; hairs of whorls long, dense, brown with yellowish luster. Coloration similar to the female. Wings narrower than in the female, stems of the fork-cells longer; vestiture sparse. Abdomen long, depressed, straight-sided, the white basal bands less incised and broader than in the female; lateral ciliation long and abundant, pale yellowish. Claw formula, 1.1–1.1–1.1.

Length: Body about 5.5 mm.; wing 4.5 mm.

Genitalia (plate 34, fig. 225): Side-pieces stout, about twice as long as broad, tips conically tapered, apical lobe absent, basal lobe forming a prominent angle, large, densely hairy. Clasp-filament obliquely subtruncate, with a short branch on inner side at apical fourth which bears a rather long articulated spine, three small hairs at tip and a few minute ones on the surface. Harpes elliptical, concave, inner margin thickened and revolute, tip pointed and bent outward. Harpagones absent. Unci small, approximate, the tips attenuated, revolute, curved inward, serrate on the proximal aspect. Basal appendages undeveloped.

Larva, Stage IV (see figure of the entire larva, plate 66).—Head rounded, broad, narrowed but nearly straight before the eyes, the front margin broadly arcuate. Antennæ moderate, subcylindrical, slightly tapered, shortly spined all over; a small tuft a little before middle; a terminal slender spine, a stout spine, two small digits and one on a pedestal. Eyes large, transverse, pointed. Upper

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pair of dorsal head-hairs in threes, lower pair in twos, ante-antennal tufts multiple. Mental plate triangular, about as long as wide, central tooth rounded, nine closely set side-teeth, then two more remote and two others distantly detached. Mandible quadrangular, smooth without; two filaments near tip; an outer row of cilia; nine filaments on outer edge; dentition of four teeth on a process, the first and third longer, a filament at base and three short remote teeth, a broad filament and a slender one and three setæ within; process below with a small fork and patches of hair; basal angle with three long setæ within; five long stout setæ at base. Maxilla elongate hemispherical, divided by a suture; inner half hairy, a tuft of long hairs at tip, outer half with hairs toward base and with two filaments near the suture and a spine on the other side; palpus small, with some hairs and four minute irregular digits. Thorax rounded, wider than long; hairs moderately abundant, not long, the subdorsal prothoracic hairs single and very small. Abdomen stout, anterior segments shorter; hairs short, the laterals of the first two segments multiple, double on third to fifth, single on sixth; secondary hairs minute. Tracheal tubes broad, band-shaped, slightly expanded in the segments, narrower posteriorly. Air-tube stout, tapered on apical half, three times as long as wide; pecten reaching nearly to middle, the two distal teeth larger and detached; single tooth a long spine wide at base with four short branches, the outer one larger; a small hair-tuft beyond the pecten near middle of tube. Lateral comb of eighth segment of few scales in an irregularly double row; the single scale with an elliptical body, a long stout apical spine and short spines fringing the sides. Anal segment as long as broad, the dorsal plate reaching nearly to ventral line; dorsal tuft a brush and hair on either side; a single lateral hair; ventral brush well developed, with short tufts toward the base preceding the barred area. Anal gills moderate, ensiform, longer than the segment.

Pupa (plate 148, fig. 702).—Thoracic mass subpyriform, slightly compressed behind the head; small hair-tufts on the anterior part of thoracic dorsum; air-tubes short, moderately slender, the tip obliquely truncate; abdomen stout and large in proportion to the thorax; hairs well developed, the subdorsal ones long on the fifth and sixth segments; a small tuft at apical angles of eighth segment.

Egg (plate 146, fig. 677).—Subfusiform, less convex on one side than on the other, the ends roundedly pointed, a small gelatinous cushion at the micropyle; sculpture coarsely hexagonal, finer at the ends, elongated in the long diameter.

The larvæ live in temporary pools, appearing at intervals all summer whenever the pools are filled by rain. In the South the species partakes more of the character of an early spring species, the majority of the specimens developing early from over-wintered eggs; but this may be due to the fact that the summers are drier, and favorable pools rarer than they are in the North. Professor Smith has studied the species in New Jersey and says:

"Larvæ of this species occur almost everywhere except on the salt marshes or in positively foul water. They are common in woodland pools, tho second to *canadensis* there, and they are dominant in open swamp areas. In the Passaic Valley, specimens appear in early April and in the Great Piece meadow every pool will be found loaded with larvæ at almost all times. The eggs do not seem to hatch evenly in Spring and young larvæ will be found when there are already pupæ in the same pool. * * * * As early as May 9th, Mr. Grossbeck found adults plentiful in the Garret Mountains, near Paterson, and large larvæ in the pools. May 21st, there was a young brood in the pools in the Great Piece Meadows and in early June, broods were found in the woodland pools along the Whippany River near Morristown, and in the Orange Mountains. Late in June full grown larvæ were in the pools on the Preakness Mountain, near Paterson,

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and before July 1st the adults were out in force. In the Black River Swamp they were found in the same condition at about the same time and so, on June 30th, mostly pupæ were found in woodland pools on the borders of Spring Lake, near Trenton. July 21st, there was a young brood in the pools surrounding Lake Hopatcong, and a few days later mature larvæ and pupæ were taken everywhere in pools in the Hackensack Valley. The entire Passaic and Hackensack Valleys were kept under observation during 1903, as were also those large swamp areas in Essex and Morris Counties and always *sylvestris* was the dominant species. Captures of adults sent in from this territory always showed *sylvestris* present, and that species breeding in a swamp area at Vailsburgh, become common in the sendings of adults from Montclair and South Orange.

"From the region of the Delaware the open marsh areas almost always turned out *sylvestris* in numbers. Mr. Grossbeck found it the dominant species between Trenton and Bordentown. Mr. Seal sent it in by the hundred from the swamp areas near Delair and toward the river. Mr. Viereck found the species along the Big Timber Creek region and in the marsh areas south of Camden. He also found it in the Cape May inland swamp region. This is, therefore, essentially a swamp species, but it does not occur in deep or dark swamps. Mr. Brakeley never found it in the huckleberry swamps of Lahaway and indeed rarely sent in the species in any stage, nor did I find it in my cranberry swamp collections.

"By far the greater number of larvæ were taken in permanent water areas, but many of the woodland pools in which it occurred were temporary in the sense that they usually dried out before the summer was over. It was never sent in from gutters or lot rain pools or from foul waters at any time. Mr. Viereck found it once in a barrel at Cold Spring, Cape May County. In New Brunswick a brood was found in a lot pool August 12th, larvæ being mature and pupæ already present; a second brood was found September 23d in a similar stage and there may have been a brood in the interval. This is a low springy place, which rarely dries out entirely and which fills readily with even a light rain. The latest collections of larvæ were made during the early days of October, adults emerging about the middle of the month."

Knab, in western Massachusetts, found that the species was most in evidence late in the summer and in early autumn. He found no larvæ early in the spring and his earliest adults bear the date of June 28. His captures show that the species was present in some numbers in July and most abundant in September.

The adult females frequent the woods, where they are more or less troublesome all the season, but they are not particularly aggressive and do not enter houses to any extent. Both sexes have been observed by Dr. Graenicher visiting flowers in numbers to feed on the honey. Prof. Smith remarks that they get indoors quite readily but only through large openings, and they will not crawl through screens or crevices. The species is abundant and has an unusually wide distribution.

North America from Canada to northern Mexico.

Younghall, New Brunswick, July 4, 1908 (A. Gibson); Ottawa, Ontario, June 18, 1906 (J. Fletcher); White River, Ontario, June 24, 1907 (F. Knab); Minneapolis, Minnesota, July 22 (T. Pergande); Euclid, Minnesota, August 27 (R. P. Currie); Aweme, Manitoba, June 25, July 19, 1907 (N. Criddle); Winnipeg, Manitoba, June 22, 1907 (F. Knab); Portal, North Dakota (A. N. Caudell); Brookings, South Dakota (J. M. Aldrich); Mitchell, South Dakota, October, 1902 (E. L. Fullmer); Dillon, Montana, August 4, 1908 (R. A. Cooley); Moose Jaw, Saskatchewan, August 24, 1906 (Dyar and Caudell); Kaslo, British Columbia, June and July, 1903 (H. G. Dyar); Ainsworth, Brit-

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ish Columbia, June 10, 1903 (R. P. Currie); Portland, Oregon, July 30, 1906 (Dyar and Caudell); Center Harbor, New Hampshire, August 23, 1902 (H. G. Dyar); Tupper Lake, New York, August 6, 1904 (H. G. Dyar); Rochester, New York, June 27, 1901 (W. V. Ewers); Ogdensburg, New York, June 3, 1900 (L. O. Howard); Beverly, Massachusetts, June 2, 1876 (E. Burgess); Jamaica Plain, Massachusetts, August 25, 1868 (————); Springfield, Massachusetts, June 28, 1903 (F. Knab); Chicopee, Massachusetts, July 8-24, August 28, October 6, 1903 (F. Knab); Montgomery, Massachusetts, September 10, 1903 (F. Knab); Nantucket Island, Massachusetts, October 14, 1900 (B. G. Wilder); Suffield, Connecticut (G. Dimmock); Summit, New Jersey, May 17, 1901 (La R. Holmes); Elizabeth, New Jersey, October 9 (J. B. Smith); New Brunswick, New Jersey, August 1 (J. B. Smith); Short Hills, New Jersey, May 27, 1906 (N. W. Fenwick); Plummer's Island, Maryland, August 19, 1902 (H. S. Barber); Washington, District of Columbia, August 17, 1900 (W. B. Hinds); Del Ray, Virginia, June 8, 1903 (F. C. Pratt); Urbana, Illinois, September 2, 1904 (F. Knab); Rives, Tennessee, July 27, 1904 (H. S. Barber); Athens, Tennessee, August 21, 1904 (H. S. Barber); St. Louis, Missouri, September, 1904 (A. Busck); Flat River, Missouri, October 25, 1906 (T. Pergande); Brunswick, Georgia, March 6, 1911 (G. Coester); Jacksonville, Florida, March 2, 1905 (Dyar and Caudell); West Tampa, Florida, March 18, 1905 (H. G. Dyar); Ormond, Florida, March 16, 1905 (Dyar and Caudell); New Smyrna, Florida, March 21, 1905 (Dyar and Caudell); Corinth, Mississippi, August 14, 1904 (H. S. Barber); Westpoint, Mississippi, August 11, 1904 (H. S. Barber); Clarksdale, Mississippi, July 31, 1904 (H. S. Barber); Belzona, Mississippi, August 3, 1904 (H. S. Barber); Baton Rouge, Louisiana, November, 1902 (H. A. Morgan); Scott, Pulaski County, Arkansas, August 23, 1909 (J. K. Thibault, jr.); Dallas, Texas, September 15, 1905 (F. C. Pratt); Victoria, Texas, May 10, 1904 (E. G. Hinds); Alligator Head, Texas, July 10, 1901 (J. D. Mitchell); Denver, Colorado, August (E. S. Tucker); Grand Junction, Colorado, July 23, 1906 (E. P. Taylor); Elsinore, Utah, August 6, 1907 (E. S. G. Titus); Albuquerque, New Mexico, September 16 (T. D. A. Cockerell); Pecos, New Mexico, June 26 (Grabham and Cockerell); Tacna, Arizona, April 15 (H. G. Hubbard); Juarez, Chihuahua, Mexico, May 12 (T. D. A. Cockerell).

The genitalia of *Aëdes sylvestris* are unique among the species of our fauna. Dr. Felt has founded a genus upon them, but it is not supported by other characters. The European *Aëdes vexans* Meigen (*Culex vexans*, Syst. Beschr. europ. zweifl. Ins., vi, 241, 1830; Blanchard, Les Moustiques, p. 309, gives the synonymy=*articulatus* Rondani=*malariæ* Grassi), as we have long suspected, proves to be identical with our form and both will have to be included under the earlier name, *vexans*. Mr. F. W. Edwards of the British Museum has recently compared male genitalia of American and European specimens and finds them the same; the coloration characters likewise agree. Unfortunately it is too late to make the necessary changes and additions in this work, in conformity with its scope. There is also an African representative in *Aëdes cumminsii* (*Culex cumminsii* Theobald, Mon. Culic., iii, 214, 1903; *Culicada mediopunctata* Theobald, Mon. Culic., v, 304, 1910; *Culicada fuscopalpalis* Theobald, Mon. Culic., v, 307, 1910; *Ochlerotatus cumminsi* Edwards, Bull. Ent. Res., ii, 248, 1911), as evidenced by the male genitalia of *fuscopalpalis* (Theobald, Mon. Culic., v, 309, fig. 143). As already indicated in our description, the structure of the claws on the hind feet of the female is subject to variation; it therefore does not serve for specific diagnosis, as employed by Coquillett (U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, p. 20, 1906).

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AËDES CANTATOR (Coquillett) Dyar & Knab.

Culex sp. ? (Salt marsh), Smith, Ent. News, xiii, 301, pl. xv, f. 12, 1902.
Culex cantans Dyar (not Meigen), Proc. Ent. Soc. Wash., v, 47, 1902.
Culex cantator Coquillett, Can. Ent., xxxv, 255, 1903.
Culex cantator Smith, N. J. Agr. Exp. Stat., Bull. 171, 22, 1904.
Culex cantator Felt, Bull. 79, N. Y. State Mus., 293, 1904.
Culicada cantator Felt, Bull. 79, N. Y. State Mus., 391b, 1904.
Culex cantator Dyar, Journ. N. Y. Ent. Soc., xiii, 28, 1905.
Grabhamia cantator Dyar, Proc. Ent. Soc. Wash., vii, 48, 1905.
Culex cantator Smith, N. J. Agr. Exp. Stat., Rept. Mosq., 231, 1905.
Culex cantator Britton & Viereck, Rept. Conn. Agr. Exp. Stat., 1904, 268, 272, 273, 1905.
Culex cantator Blanchard, Les Moustiques, 629, 1905.
Culicada cantator Felt, Bull. 97, N. Y. State Mus., 476, 1905.
Aëdes cantator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 200, 1906.
Ochlerotatus cantator Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 20, 1906.
Ochlerotatus cantator Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 5, 1906.
Culex cantator Smith, Can. Ent., xxxix, 119, 1907.
Culicada cantator Theobald, Mon. Culic., iv, 334, 1907.
Culex (*Ochlerotatus*) *cantator* Viereck, 1st Ann. Rept. Comm. Health Pa., 471, 1908.
Culicada cantator Theobald, Mon. Culic., v, 301, 1910.
Aëdes cantator Morse, Ann. Rept. N. J. State Mus., 1909, 718, 1910.

ORIGINAL DESCRIPTION OF CULEX CANTATOR:

Female. Near *sylvestris*, but the seventh abdominal segment almost wholly yellow scaled, etc. Head black, oral margin and base of antennæ yellow, remainder of antennæ and the proboscis black, palpi brown, its scales chiefly concolorous, no cluster of white hairs or scales at their apices; narrow scales of middle of occiput golden yellow, the upright ones chiefly black, sides of occiput covered with depressed whitish scales and with a small cluster of black ones; thorax reddish brown, scales of mesonotum golden yellow, becoming pale yellow in front of the scutellum and on the pleura; abdomen black, its scales black, except a crossband of yellowish white ones at base of each segment, the bands considerably narrowed at the middle, similar scales scattered over the sixth and nearly the whole of the seventh segment and along apices of the two preceding segments; legs yellow basally, becoming brown on the tibiæ and tarsi, scales of femora chiefly pale yellow, of the tibiæ mostly black, those on the hind side pale yellow, on the bases of the tarsal joints whitish, those on the second joint of the hind tarsi covering about one-fourth the length of the joint, front tarsal claws toothed; wings hyaline, lateral scales of the veins long and narrow, hind crossvein nearly its length from the small crossvein, petiole of first submarginal cell from one-half to four-fifths as long as the cell; length 4 mm. One specimen bred May 6, by Mr. LaRue Holmes.

Habitat.—Summit, New Jersey.

I have also examined 8 females and as many males, bred by Prof. J. B. Smith, from the salt-marshes of New Jersey. In the male the scales of the palpi are black, those of the under side and at bases of the last two joints yellowish white, no whitish band at base of the antepenult joint.

Prof. Smith informs me that the larva is readily separated from that of *sylvestris*.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES CANTATOR:

Female.—Proboscis moderately slender, subcylindrical, the labellæ conically tapered; vestiture brownish black; setæ minute, curved, black, those on the labellæ more prominently outstanding. Palpi short, about one-fifth as long as the proboscis, black scaled, the tip minutely white; setæ rather short, black. Antennæ with the distal joints longer than the basal ones, rugose, pilose, black; second joint thickened, pale at base; tori subspherical, with a cup-shaped apical excavation, pale yellow without, blackish within. Clypeus shortly conical, prominent, blackish-brown, nude. Eyes brownish-black. Occiput blackish, broadly clothed with narrow, curved scales, in the middle pale ocherous, on the sides pale brown, intermixed with many erect, slender forked scales, some black, some pale; cheeks dirty white, with a small, triangular black patch well up the side at eye-margin; setæ along the margins of the eyes black, a tuft of golden yellow ones projecting forward between the eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with narrow, luteous brown scales and black bristles. Mesonotum dark brown, uniformly clothed

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with narrow, curved bright bronzy brown scales, yellowish about the antescutellar space, and a short stripe of light scales on either side of it. Scutellum trilobate, luteous, clothed with yellowish scales, each lobe with a group of golden-brown bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ brown, coxæ ocherous yellow, clothed with elliptical, flat, white scales in patches and rows of pale bristles; epimera of prothorax clothed with bronzy brown scales similar to those on mesonotum.

Abdomen subcylindrical, flattened, the posterior segments tapering; vestiture dull black, a broad ill-defined band of dull creamy white scales at base of each segment, their apical margins very narrowly pale scaled, sixth segment with the basal band very broad and laterally expanded, the last two segments almost wholly whitish scaled above, a series of large, lateral, segmentary, basal, triangular whitish patches joined to the basal bands, confluent on distal segments, first segment white scaled and with many pale hairs; venter clothed with dull yellowish white scales, a medio-ventral row of elongate, indistinct black patches. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell much shorter than its cell, that of second posterior cell about equal to its cell; basal cross-vein slightly less than its own length distant from anterior cross-vein; scales of the veins brownish black, those on costa and first vein with blue reflection, the outstanding one long and narrowly linear. Halteres entirely whitish.

Legs moderately slender; femora with yellowish-white scales beneath and mostly black ones above, extreme tips pale; tibiæ with black and pale yellow scales intermixed, a small pale spot at base; tarsi black, each joint of hind ones with a small yellowish-white basal ring; first tarsal joint of all legs with some whitish scales on inner side; last two joints of fore tarsi and last joint of mid tarsi without pale rings. Claw formula, 1.1–1.1–0.0.

Length: Body about 5 mm.; wing 4.5 mm.

Male.—Proboscis long and slender, straight. Palpi about as long as the proboscis, the terminal joints slightly enlarged; vestiture brownish black, without white ring at middle of long joint, some white scales at bases of last two; end of long joint and last two joints with many dense black hairs. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, white, a broad black ring on the incrassated insertions of the hair-whorls; hairs of whorls long, dense, brown with yellowish luster. Coloration similar to the female. Wings narrower than in the female, stems of the fork-cells longer; vestiture sparse. Abdomen long, slender, depressed, the basal bands broader and laterally prolonged, the last two segments mostly whitish scaled; lateral ciliation long, abundant, pale yellow. Claw formula, 1.1–1.1–0.0.

Length: Body about 5.5 mm.; wing 4.5 mm.

Genitalia (plate 27, fig. 184): Side-pieces over twice as long as wide, slender, curved, apical lobe prominent, rounded, continued along the side-piece to the base; basal lobe forming a rounded angle, bearing a stout spine and a group of small setæ. Clasp filament long and slender, slightly enlarged along middle portion, with three small spines before the tip and a long terminal articulated spine. Harpes flat, concave, inner margin thickened and revolute, tips tapered to a point and bent outward. Harpagones with a long columnar base curved in an arc, the terminal articulated filament broadly spatulate, slightly angled on one side at the apical third. Unci approximate, slender, revolute, forming a rounded-tipped cylinder. Basal appendages small, with a few stout setæ.

Larva, Stage IV (see the figure of the entire larva, plate 67).—Head rounded, narrowed before the eyes, a slight notch at insertion of antennæ, front margin broadly arcuate. Antennæ slender, subcylindrical, tapering a little, well spined all over; a small tuft a little before the middle; four spines of different lengths

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at tip and a stout digit. Eyes large, pointed. Both pairs of dorsal head-hairs and ante-antennal tuft multiple. Mental plate triangular, a central tooth and ten on each side becoming slightly larger and more remote basally. Mandible quadrangular, elongate, a few blunt spinules toward the base; two filaments near tip, one of which is short; an outer row of cilia from a collar; ten filaments and two hairs on outer edge; dentition of three teeth on a prominence, preceded by a stout tooth with two stout ones at base, a broad filament and five feathered hairs within; process below furcate, with groups of hairs; basal prominence large, with six filamentous hairs within; five large hairs at base. Maxilla elongate, constricted subapically, the tip truncate, divided by a band-shaped suture; inner half with stout hairs on the margin, a row near middle and a long suture; a crown of long hairs at tip; outer half with two long filaments outwardly upon the suture and a spine on the other side; palpus with wide base and four minute digits at tip. Thorax rounded, wider than long; hairs abundant, not long, the subdorsal prothoracic ones in fours. Abdomen moderately stout, the anterior segments shorter; hairs moderate, the laterals of first segment multiple, double on second to sixth; secondary hairs few, but the subdorsal tufts of third to seventh segments rather long. Tracheal tubes broad, band-shaped, slightly expanded in the segments. Air-tube stout, tapered on apical half, three times as long as wide; pecten reaching nearly to middle, the teeth evenly spaced, the single tooth a long spine with wide base and two subdorsal branches; a multiple tuft at middle, beyond pecten. Lateral comb of eighth segment of many scales in a triangular patch; single scale elongate, fringed with spines of which the apical one is longest, the subapical ones being only about half as long. Anal segment longer than wide, the dorsal plate reaching two-thirds of the way down the sides, straight on lateral margin; dorsal tuft a brush and long hair on either side; a single lateral hair; ventral brush well developed but short, the tufts preceding barred area running up the ventral line nearly to base. Anal gills very short, bud-shaped, about one-third as long as the segment.

The larvæ occur in seaside pools and marshes, containing salt or fresh water. They appear in the pools after the larvæ of *Aëdes sollicitans* are gone, and also in pools further from the sea, such as *sollicitans* does not inhabit. The species is not found, however, in inland pools. A brood develops whenever the pools are filled by high tides or by rains. Professor Smith has studied the species in New Jersey and says:

"Eggs are laid in places and as described for *sollicitans*. There are more of them, however, and they are a trifle larger. On the whole, under ordinary conditions, larvæ are found nearer the upland and rarely on the upland itself. In such cases they are probably from exceptional females developing eggs after leaving the marsh.

"As to the water, it may be fresh or salt or anything intermediate, but, on the whole, fresh water pools formed by rains or by drainage from the highland are preferred. In an exceptional season like 1904, tide pools are just as well filled as the others.

"The eggs hatch just as readily as those of *sollicitans*, and when young it is almost impossible to distinguish the two species. As they become larger the maculate head of *cantator* becomes obvious, and then it resembles *tæniorhynchus* so closely that without a lens it is impossible to discriminate between them. When full grown the shorter tube of the latter species and the somewhat larger size of *cantator* give a basis for a distinction which it requires experience to make. The pupa does not differ obviously from the others with which it is found.

"As to the number of broods, that depends upon the weather; but in midsummer, when the marshes become egg-covered, every heavy rain or extra tide

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means a developing mass. The early brood hatching in March develops slowly and irregularly, and while adults begin to emerge early in April, it is not until the beginning of May that all are out. Larvæ of the second series are not found much before the beginning of June, and they mature during the last days of that month. Thereafter every pool will have larvæ in some stage and every rain will make some pools. A period of drought followed by a storm and accompanied by a high tide will produce another general hatching, and so on, as already set out in the general description of marsh breeding."

The adults fly all summer and are generally troublesome near the sea-coast. In Maine Dr. Dyar found this practically the only mosquito present in August, and so numerous on the beach as to prevent one from walking there after sunset. Like the other salt-marsh breeders, the females of this species fly long distances inland. In New Jersey Professor Smith had the following experiences:

"This species was not recognized as distinct until 1903, but was confused with both *cantans* and *sylvestris*. It was this fact that prevented its recognition as a migrant in 1902, when I first met with the species in great numbers and found it as early as April, the dominant form in South Orange. *Sylvestris* and *cantans* are both known as upland species, hence a local breeding place was sought and not found. Later in the season the breedings from the marshes turned out this species in numbers almost equal to *sollicitans*, from a wriggler much like that of the latter. At that time I insisted upon the distinctness of the species and, finally, Mr. Coquillett described it, calling it *cantator*—perhaps because of its general resemblance to *cantans*. In the Spring of 1903, I had abundant opportunity for observing it. As early as March 23d, larvæ were well advanced at the edge of the Newark Marsh, and adults began to issue during the early days of April. But it was not until the last days of the month that the bulk of the brood began to issue, and during the early days of May the migration was on in full force. May 12th, they had reached South Orange, and by the middle of the month the entire country was covered with them. A second and much larger brood became started on the marshes late in May, and before the end of June was fully a-wing. Migration began during the last days of June and, north and west, locality after locality was covered to an extent greater than usual. *Sollicitans* was also in this swarm which filled the cities and towns bordering on the marsh as they had rarely been filled before.

"The early brood in the Raritan marshes had not been heavy and few specimens got as far west as New Brunswick; but the same conditions that started the June brood at Newark started that on the Raritan. Frequent trips by one or the other of my assistants had kept me fully advised of the developments, and I anticipated that by July 1st we might get our first supply. It came as expected; full measure, heaping and overflowing. On the morning of July 2d, I was met when I stepped outdoors by a famished horde containing *sollicitans*, *tæniorhynchus*, and *cantator*. The preceding evening we had sat comfortably out on the porch, without disturbance from mosquitoes. The incoming horde settled the comfort for weeks thereafter.

"This same brood was traced to Plainfield, Dunellen, Bound Brook and Somerville, where the migratory forms rarely get. How much further they spread in that direction I do not know, but the Newark swarm was traced to Summit and Morristown, and may have extended further.

"In 1904 marsh conditions favored the early brood and unusual swarms developed on the Raritan, Elizabeth and Newark meadows early in May; indeed the favoring conditions extended all along shore so that by May 10th the whole marsh area was awing, except along the Shrewsbury, where the work done by the Monmouth Beach and Rumson Neck Associations completely annihilated the

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immense brood that was developing. The ditches were completed just in time to do their work. At New Brunswick the swarm arrived May 12th, and extended onward. At Newark the invasion was almost unprecedented and compelled the closing of stores in some cases. This swarm not only reached Paterson, but covered the Garret Mountain, where Messrs. Dickerson and Grossbeck found them swarming June 11th. It was reported further that it had extended to Bernardsville, which is well up in the hills, and far enough back to be beyond the reach of ordinary migrations. So in the Pines, *cantator* reached Lahaway May 17th, weeks ahead of the 1903 record.

"There is one feature in which *cantator* differs from the other migratory forms, i. e., both sexes fly together for some distance and occasionally females with developed ovaries are found far from any point where they can deposit them with any hope of development. The males are seen for a day or two only, but they arrive with the females and are evidently able to stand a flight of several miles at least. In Newark and Elizabeth both sexes may be taken on first arrival in equal numbers; at New Brunswick the males are numerous enough to 'dance' in small swarms just at dusk. From Lahaway no males have been sent and my records are not sufficiently complete to give the limit of male flight.

"While, as has been noted, occasional females with developed ovaries are found at some distance from shore, yet this is a feature only in the early arrivals; *i. e.*, they occur during the week or two after a flight and disappear, none being found during the later days of the brood's stay. Whether they make their way back to the marshes to oviposit, or whether they lay their eggs in the most likely place to be found, is not definitely known. As the percentage of such females is larger in Newark and Elizabeth than in New Brunswick, it is quite probable that many find their way back, and as an occasional brood of the larva is found above the marsh line, it is possible that some may lay eggs which in most instances fail to develop.

"In New Jersey *cantator* dominates the Newark, Elizabeth and Raritan meadows early in the season. If the year is favorable, the early start will carry this dominance to midsummer or even through the summer. At the Barnegat shore *cantator* shares with *sollicitans* the early honors, but becomes steadily less as the season advances, leaving *sollicitans* in almost sole possession. At Atlantic City and Cape May I found no *cantator* during the period when they were swarming further north, though the species does occur there in small numbers throughout the summer. Mr. Brakeley's records show that they must have bred on the Mullica River marshes in greater number than *sollicitans* during the present year; but this is probably the southern limit of their dominance, and in ordinary seasons it does not extend so far. Just why they should be more plentiful on the northern marshes I do not know, nor what prevents their development along the southern shore.

"In 1903 I found no appearance of *cantator* dominance south of Sandy Hook; in 1904, as soon as the May swarm developed, I sent Mr. Brehme along the Barnegat shore to Manahawkin, where he found them everywhere, while I sent Mr. Dickerson to Cape May and went myself to Atlantic City, finding only *sollicitans* in both places. Twice, in June, I visited Cape May and at neither times found *cantator*.

"*Cantator* enters houses freely where they are open; but is easily kept out by ordinary screening. It does not seek opportunities, but when attracted by light or the human odor it will come indoors much more readily than *sollicitans*. Among the indoor captures by Mr. Buchholz, this species is well represented throughout the season, scarcely yielding at times to *pipiens*. It comes to porches readily enough and does not hesitate about getting into the breeziest corners.

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"As a biter, *cantator* stands in the front rank, and it is persistent in its attack. It does no unnecessary singing and is not especially deliberate in choosing a point of attack. It proceeds to business at once, and while its bite is not so 'hot' as that of *sollicitans*, i. e., it does not give the intense burning sensation, it is really more painful and more lasting in its effects.

"It might be added that this species flies during the day and bites when opportunity offers; but it is not so active as *sollicitans* in this respect and rises only when disturbed. It is essentially an evening mosquito."

North Atlantic coast of United States.

Lincolnville, Maine, August, 1907 (H. G. Dyar); Melrose Highlands, Massachusetts, May 22, 1908 (F. B. Lowe); Weekapaug, Rhode Island, July 22, 1903 (H. G. Dyar); New Haven, Connecticut, May 12, 1904 (H. L. Viereck); Bellport, New York (H. G. Dyar); Sheepshead Bay, New York, July 22, 1900 (H. C. Weeks); Center Moriches, New York, September, 1903 (P. Fowler); Babylon, New York, July 1, 1903 (W. W. Hewlett); Northport, New York, July 7, 1903 (J. P. Heyen); Summit, New Jersey, May 6 (La Rue Holmes); Salt Meadows, New Jersey, April 10 (H. Brehme); South Orange, New Jersey, July 20, 1903 (S. Miller); Fort Hancock, New Jersey (through C. S. Ludlow).

AËDES SQUAMIGER (Coquillett) Dyar.

Culex squamiger Coquillett, Proc. U. S. Nat. Mus., xxv, 85, 1902.
Culex squamiger Felt, Bull. 79, N. Y. State Mus., 281, 1904.
Culicada squamiger Felt, Bull. 79, N. Y. State Mus., 391c, 1904.
Grabhamia de niedmannii Ludlow, Can. Ent., xxxvi, 234, 1904.
Culex squamifer Blanchard (in part), Les Moustiques, 630, 1905.
Grabhamia niedmanni Blanchard, Les Moustiques, 631, 1905.
Grabhamia de neidmannii Ludlow, Can. Ent., xxxviii, 132, 1906.
Lepidoplatys squamiger Coquillett, Science, n. s., xxiii, 314, 1906.
Lepidoplatys squamiger Quayle, Bull. 178, Univ. Cal. Agr. Exp. Sta., 41, 1906.
Taeniorhynchus squamiger Quayle, Can. Ent., xxxviii, 27, 1906.
Lepidoplatys squamiger Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 18, 1906.
Culex squamiger Grossbeck, Can. Ent., xxxviii, 129, 1906.
Aëdes squamiger Dyar, Proc. U. S. Nat. Mus., xxxii, 126, 1907.
Lepidoplatys squamiger Theobald (in part), Mon. Culic., iv, 501, 1907.
Lepidoplatys squamiger Theobald (in part), Mon. Culic., v, 453, 1910.

ORIGINAL DESCRIPTION OF CULEX SQUAMIGER:

Head and its members black, middle of proboscis brownish, scales of occiput mixed golden and pale yellow, many black ones along the eyes, palpi black scaled, those at base, before the middle and at apex white; body black, scales of middle of mesonotum golden brown, those along the sides and on the pleura pale yellow, bristly hairs of thorax mostly black, those of scutellum chiefly yellow; scales of abdomen black, a large patch at base of each segment and several scales scattered over the remainder pale yellow, scales of venter pale yellow; femora and tibiae brown, the scales mixed black and yellow, not forming distinct bands, posterior side of the femora yellow and yellow scaled; tarsi black, the scales mixed black and yellow, a band of whitish scales at bases of the last four joints, claws toothed; wings hyaline, veins yellow, densely covered with rather broad mixed brown and whitish scales and with many very narrow ones in the apical third of the wing, petiole of first submarginal cell about two-thirds as long as that cell, crossvein at apex of second basal cell less than its length from the one above it; halteres yellow, the knobs marked with brown; length, 5 mm. Four female specimens.

Habitat.—Palo Alto (V. L. Kellogg), and San Lorenzo (G. Eisen), California.

Type.—Cat. No. 6256, U. S. N. M.

ORIGINAL DESCRIPTION OF GRABHAMIA DE NIEDMANNII:

Female.—Head dark brown, covered with ochraceous curved scales, ochraceous forked scales on the occiput, flat ochraceous, with a few brown scales on the sides, a line of light scales around the eyes, and a few light hairs projecting forward between the eyes; antennae brown, verticles brown, pubescence light, basal cell sparsely white-scaled, first joint heavily white-scaled on the inner side; proboscis mostly light-scaled, a few scattered brown scales, and the very base and tip dark; palpi dark, with white tips and a white band about two-thirds the way down, probably at the apex of the second joint, a few white scales at the base; eyes brown; clypeus brown.

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Thorax dark brown, the median portion (about one-third the width of the mesothorax) heavily covered with golden-brown slender curved scales; just exterior to this on either side is a very narrow white line extending to the scutellum. There are also two submedian very narrow white lines extending the whole length of the mesothorax and curving around the "bare spot." Laterad the mesothorax is densely covered with broader ochraceous scales, becoming white just over the wing joint, and directly dorsad of this white spot is a large dark brown spot, suggesting an "eye spot"; pleura dark brown, heavily scaled with broad curved light ochraceous to white scales; scutellum dark brown, with ochraceous slender curved scales and numerous brown bristles; metanotum dark brown.

Abdomen dark scaled, with a few light scales scattered irregularly through the brown, and a heavy basal white spot very much deepened on the median line, so that it curves down in the middle, and on some of the segments covers nearly one-half the segment. There are also heavy basal lateral spots, but not always continuous with the dorsal spot, which in most instances hardly creates a band. The last few segments are much less heavily marked, but may have very narrow apical light bands, which, however, do not usually extend all the way across; light apical hairs on all segments. Venter mostly light scaled.

Legs: coxæ and trochanters all mostly light scaled. Femora all ventrally light, but speckled, dark and light scales nearly equally mixed on the dorsal side, the brown scales preponderating towards the apex, so that the femora are quite dark near the distal end, but the apex itself has a ring of white scales, which, with a few at the base of the tibiæ, make distinct knee spots; tibiæ somewhat darker than the femora, the dark scales in excess, and growing more so towards the apex; metatarsi dark, like tibiæ, and all basally light-banded, but in the fore legs the bands are not very distinct. All the tarsal joints basally light-banded, the bands on mid and fore legs narrow, sometimes minute, and that on the last joint of the fore legs sometimes missing; on the hind legs the bands are much broader and conspicuous. All the ungues large, equal and uniserrate.

Wings rather heavily covered with dark and light scales, both median and lateral scales very heavy and spatulate on most of the veins, but those on the under side of the wing are narrow. First submarginal cell longer and narrower than the second posterior, bases nearly on a line; the stem of the first submarginal about one-third the length of the cell. Supernumerary cross-vein a little longer than the mid, which it meets at a marked angle; posterior cross-vein also a little longer than mid and nearly twice its length distant. Halteres light with dark knobs.

Length: 7 mm. Habitat: Benicia, Cal. Taken March, April and May.

While this species lies near *vittata*, Theobald, and *dorsalis*, Meig., it differs from the first in abdominal markings, in white scales on the two veins, etc., and from the latter also in abdominal markings and in the tarsal banding, which in this species does not include both sides of the joints.

The specimens were sent in a series of collections by Dr. William F. de Niedmann, Post Surgeon, Benicia Barracks, Cal.

DESCRIPTION OF FEMALE, MALE, LARVA, AND EGG OF AËDES SQUAMIGER:

Female.—Proboscis moderate, subcylindrical, uniform, the labellæ conically tapered; vestiture black with many dull white scales intermixed which predominate broadly along the central portion without forming a defined band; setæ minute, black, those on the labellæ more prominently outstanding. Palpi short, about one-fifth as long as the proboscis; vestiture of black scales with a few white ones intermixed, especially at the tips and at the segmentations; setæ moderate, black. Antennæ moderate, the joints subequal, rugose, black, pilose; tori subspherical, with a cup-shaped apical excavation, yellowish, dark on inner side, with a patch of small yellowish-white scales; second joint stouter than the others, yellowish at base; hairs of whorls sparse, moderate, black. Clypeus roundedly conical, convex, blackish with a white pruinosity, nude. Eyes black. Occiput black, broadly clothed with rather broad curved scales, dull whitish medianly and slightly tinged with brownish toward the sides, with many slender, erect, forked, black ones; cheeks clothed with white scales, a small black spot well up the sides at eye-margin; setæ along margins of eyes black, those projecting between the eyes pale.

Prothoracic lobes elliptical, remote dorsally, black, clothed with whitish scales and black bristles. Mesonotum black, densely clothed with rather broad

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curved scales, mostly light bronzy brown but intermixed with dull yellowish-white ones somewhat irregularly disposed along the margins of the disk, about the antescutellar space and in a pair of narrow longitudinal lines. Scutellum trilobate, gray, clothed with whitish scales, each lobe with a group of black bristles. Postnotum elliptical, prominent, blackish with a white pruinosity, nude. Pleuræ blackish, coxæ lighter, clothed with patches of broad, flat, white scales and rows of small dark bristles.

Abdomen subcylindrical, flattened, the posterior segments tapered; dorsal vestiture black with a few sordid-yellowish scales intermixed, each segment with an ill-defined, broad, basal, subtriangular, laterally interrupted, dull white band and very narrow, rough, apical bands on the distal segments; seventh segment mostly pale scaled; sides with a row of white, ill-defined, elongate, basal segmental patches; first segment with a patch of white scales and many pale setæ; venter largely white scaled, the posterior lateral angles of segments with a black spot, these spots smaller on basal segments. Cerci black.

Wings broad, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell about equal to its cell; basal cross-vein about its own length distant from anterior cross-vein; scales of the veins very broad, triangular, black and white evenly intermixed; outstanding scales comparatively small, lanceolate; fringe unicolorous, blackish. Halteres whitish, with a black white-scaled knob.

Legs moderate; femora largely white scaled intermixed with black ones which predominate on upper side and towards tip; knees white; tibiæ black and white scaled, about evenly intermixed, the hind tibiæ blackish at tip; tarsi white ringed at base, the first joint largely white scaled beneath and with scattered white scales above, the other joints black, with a white basal ring; hind tarsi with the rings rather broad, narrower on the others; last two joints of fore and last joint of middle tarsi entirely black. Claw formula, 1.1–1.1–1.1.

Length: Body about 5.5 mm.; wing 5 mm.

Male.—Proboscis rather long, straight. Palpi slightly longer than the proboscis, the last two joints thickened, the last broadly club-shaped and flattened; vestiture black, long joint banded with white at middle, a large subapical white spot above and another towards base; last two joints largely white scaled except at tips; long hairs on last two joints and at end of long joint brown with yellowish luster. Antennæ plumose, the last two joints long and slender, black, rugose, pilose, the other joints short, white, brown at the enlarged insertions of the hair-whorls; hairs of whorls long, dense, brown with yellowish luster. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells longer; vestiture less abundant. Abdomen long, slender, depressed, the segments with broad basal white bands occupying almost half the segments, a few white scales scattered among the apical black ones, the last two segments largely white scaled; lateral ciliation abundant, pale yellowish. Claw formula, 1.1–1.1–1.1.

Length: Body about 7 mm.; wing 5 mm.

Genitalia (plate 27, fig. 188): Side-pieces over twice as long as wide, rounded at tip; distal lobe rounded, very prominent, situated subapically, basal lobe quadrately expanded, with a large spine and many small setæ at the base. Clasp-filament long and slender, slightly enlarged medianly, serrate, with three small setæ towards tip, a long terminal articulated spine. Harpes elliptical, concave, inner margins thickened and revolute, apex narrowed and terminating in a point which is bent outward. Harpagones with a slender columnar stem slightly curved, with a stout seta near base and a long terminal filament, its basal half slenderly ligulate, outer half triangularly enlarged, almost notched. Unci approximate, revolute, forming a short, broad cylinder with rounded tip. Basal appendages small, bearing several stout setæ.

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Larva, Stage IV (plate 122, fig. 422).—Head rounded, widest through eyes; antennæ moderate, uniform, finely spined all over, a small tuft near middle; both pairs of dorsal head-hairs double, ante-antennal tufts multiple. Lateral comb of eighth segment of about twenty scales in a diffuse patch. Tracheæ broad. Air-tube stout, about three times as long as wide, slightly tapered outwardly; pecten of evenly spaced teeth reaching over basal third, followed by a rather large multiple hair-tuft. Anal segment longer than wide, with a large dorsal plate reaching well down the sides; dorsal tuft a long hair and tuft on each side; lateral hair long, single; ventral brush well developed, with small tufts preceding the barred area. Anal gills small, bud-shaped, the lower pair slightly smaller.

Egg.—Rather thickly fusiform, one side flattened, smooth; micropylar end rounded and with a small annular cushion. White when first deposited, turning deep black.

Dr. Dyar obtained eggs from captured females on April 26, 1916. The eggs are laid singly. The larvæ inhabit the pools on the salt-marshes of the Pacific coast formed by the monthly high tides, having the same habits as those of *Aëdes onondagensis,* race *quaylei,* with which they occur around San Francisco Bay. Mr. Quayle says:

"So far as our acquaintance goes with this mosquito . . . it is wholly a salt-marsh form. . . . . Negative evidence points to the fact that the eggs remain over winter and hatch in the following February or March. . . . . [The adult is] migratory, and while it was not found across the hills toward the ocean, as was *O. lativittatus* [=*A. quaylei*], it was found abundantly enough at Burlingame and San Mateo, and in the hills at least three or four miles from its breeding ground. . . . . [It would seem] that the maximum adult life may be three months. . . . The egg-laying may be prolonged for nearly two months after emergence; altogether, our notes on this species indicate that it is longer lived than the others of this section. Its biting propensities are about as well developed as the brown marsh species [*A. quaylei*], and the only thing that prevents its occupying a place of annoyance equal to *O. lativittatus* is that it is fewer-brooded, and consequently less in numbers."

Mr. Quayle further remarks that the great majority of the specimens that reached the hills did not contain eggs. Dr. Dyar found the larvæ associated with those of *Aëdes tæniorhynchus* in southern California.

Coast region of California.

Oakland, August 26, 1903 (I. McCracken); Stanford University (V. L. Kellogg); Stanford University, April 12, 1903 (I. McCracken); San Lorenzo, June 28, 1901 (G. Eisen); Nordhoff, May 31, 1904 (A. D. Hopkins); San Diego, March 9, 1906 (J. M. French), March 27, April 20, 26, 1916 (H. G. Dyar); National City, June 19 to July 1, 1906 (Dyar and Caudell); Laguna Beach (C. F. Baker).

At one time a species from the eastern United States, which was afterwards described as *Aëdes grossbecki,* was confounded with *squamiger.* Coquillett has established a genus for *squamiger* on scale-vestiture characters, but there is nothing to sustain it, either in the structures of the imago or of the larva.

AËDES GROSSBECKI Dyar & Knab.

Culex squamiger **Smith (not Coquillett), N. J. Agr. Exp. Stat., Bull. 171, 37, 1904.**
Culex squamiger **Smith (not Coquillett), Ent. News, xv, 80, 1904.**
Culex squamiger **Smith & Grossbeck (not Coquillett), Psyche, xii, 13, 1905.**
Culex squamiger **Smith (not Coquillett), N. J. Agr. Exp. Stat., Rept. Mosq., 221, 1905.**
Culex squamifer **Blanchard (in part), Les Moustiques, 630, 1905.**
Aëdes grossbecki **Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 191, 201, 1906.**
Culex sylvicola **Grossbeck, Can. Ent., xxxviii, 129, 1906.**

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Lepidoplatys squamiger Coquillet (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 18, 1906.
Aëdes grossbecki Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 6, 1906.
Culex squamiger Howard (not Coquillett), Osler's Modern Medicine, i, 376, 1907.
Lepidoplatys squamiger Theobald (in part), Mon. Culic., iv, 501, 1907.
Lepidoplatys sylvicola Theobald, Mon. Culic., iv, 501, 1907.
Lepidoplatys squamiger Theobald (in part), Mon. Culic., v, 453, 1910.
Culex sylvicola Theobald, Mon. Culic., v, 612, 1910.
Aëdes sylvicola Morse, Ann. Rept. N. J. State Mus., 1909, 718, 1910.

ORIGINAL DESCRIPTION OF AËDES GROSSBECKI:

The New Jersey specimens identified as "*Culex squamiger* Coq." by Mr. Coquillett and published by Prof. Smith we fully believe to be a distinct species. Mr. Quayle records (Can. ent., xxxviii, 27, 1906) the true *squamiger* (Coquillett, Proc. U. S. Nat. Mus., xxv, 85, 1902) as a salt marsh species from the Californian coast, to which it is no doubt confined. The New York records of "*Grabhamia curriei* Coq." seem to refer to the present species. Unfortunately we have not been able to secure Californian larvæ for comparison, although Mr. Quayle kindly endeavored to supply us. It is quite possible that the *Culex onondagensis* Felt (Bull. 79, N. Y. Sta. Mus., 304, 1904) may prove to be this species, in which case our new name may be placed in the synonymy.

The following is an abstract of the table:

1.	Air tube with the tuft beyond the pecten	8
8.	Pecten of the air tube with evenly spaced teeth	13
13.	Comb scales more numerous to many in a patch	21
21.	Anal segment not ringed by the plate	31
31.	Tube three times as long as wide or less	32
32.	Anal plate covering more than half the segment; anal gills moderate	33
33.	Comb scales tapered, a single median spine stouter or longer, differentiated from the rest	34
34.	Lower head tuft single or double (rarely three)	37
37.	Lower head hair double (or three)	38
38.	Comb scales with the lateral spines as long as the apical one	*grossbecki*

ORIGINAL DESCRIPTION OF CULEX SYLVICOLA:

♀. Length, 6–7 mm. Head brown, occiput clothed with whitish scales and a patch of brown ones on each side of the median line contiguous to the eyes; antennæ brown, the basal joint and two following ones ochreous; proboscis and palpi blackish-brown, slightly sprinkled with white scales, the latter with the third joint rather long, the apical one minute, rounded, white scaled. The dorsum of the mesonotum is covered with cinereous scales, and a broad, median, dark brown vitta extends forward from the posterior margin, which becomes narrow anteriorly and golden-brown in colour; two other dark brown marks extend from the posterior margin not quite to the middle of the mesonotum, separated from the median vitta by a narrow line; scutellum cinereous, with brown bristles on the posterior margin; metanotum evenly brown; pleura brown, with dense, fluffy patches of whitish scales; halteres yellowish, tipped with brown and white. Abdomen blackish-brown above, with a few whitish scales intermixed; segments one to five have each a broad yellowish white band at the base, segments six and seven with an additional narrow apical band; beneath it is dirty white, with a few brown scales; genitalia brown. Legs dark brown, femora and tibiæ profusely sprinkled with whitish scales, the former yellowish on the posterior portion and at the knees; claws uniserrated; wings hyaline, the veins covered with broad brown and white scales, and also some narrow brown ones on the apical third, petiole of first submarginal cell almost two-thirds the length of this cell.

♂.—Palpi dark brown, the first joint whitish at the base, and with a yellow band in the centre; bases of the two terminal joints also whitish in some specimens; fan-like tufts brown, with yellow reflections. Abdomen with the bands restricted in the centre; claws uniserrated; petiole of first submarginal cell almost as long as this cell.

Genitalia: Clasp elongate, inner margin rounded apically; subapical lobe present, prominent, projecting laterally, setose; basal lobe well developed, setose, a long spine arising near it, which is curved at the tip; clasp filament long, curved, two small setæ near the apex, with long apical spine. Harpe jointed, basal segment curved, swollen basally; apical segment long, dilated centrally, tip curved. Harpago hood-shaped, tip bent laterally. Appendage of eighth segment with long setæ.

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Besides the great differences in the genitalia, *sylvicola* may be further distinguished from *squamiger* by the presence of the cinereous scales on the mesonotum; by the proboscis being uniformly almost black instead of pale brown, and by the much darker colour of the femora and tibiæ.

Described from 21 males and 20 females in the New Jersey Experiment Station collection.

Habitat: Livingston Park (near New Brunswick), N. J., and Westville, N. J.

This species was first taken in New Jersey, near Paterson, in April, 1903, in the larval condition; but no adults were bred therefrom. In the following spring they were again met with in Livingston Park, and in the season of 1905 they were secured from this locality in some numbers. They were found full-grown as early as April 28th—indicating an egg hibernation—and the last were taken not later than May 17th, though frequent subsequent collections were made. No larvæ were ever taken in any but fresh water, woodland pools; and adults were never seen outside their immediate breeding grounds. After emergence they continue on the wing for a period of about three months, becoming more and more worn as the season advances.

An account of the life-history of this species as far as known, and a description of both larva and adult, is given by Prof. Smith in his "Report on Mosquitoes" (N. J. State Exper. Sta., 1903–'04), and also a description of the larva in Psyche, Vol. XII, p. 13.

A description of the genitalia of *C. squamiger* is here appended for comparison with *C. sylvicola:* Clasp elongate, margins sub-parallel almost to apex, inner margin rounding abruptly toward apex; subapical lobe setose; basal lobe well developed, setose, a long spine recurved at the tip arising near it, another stout spine a short distance above this; clasp filament long, curved, four small setæ near the apex, with long apical spine. Harpe jointed, basal segment comparatively short, apical segment short, dilated centrally, tip slightly curved. Harpago hood-shaped, tip bent laterally. Appendage of eighth segment with short setæ.

DESCRIPTION OF FEMALE, MALE, LARVA, AND EGG OF AËDES GROSSBECKI:

Female.—Proboscis moderate, subcylindrical, uniform, the labellæ conically tapered; vestiture black with some white scales intermixed; setæ minute, black, those on the labellæ more prominently outstanding. Palpi short, about one-fourth as long as the proboscis; vestiture of black scales with a few white ones intermixed; setæ moderate, black. Antennæ moderate, the joints subequal, rugose, black, pilose; tori subspherical, with a cup-shaped apical excavation, yellowish, dark on inner side, with a patch of small white scales; second joint stouter than the others, yellowish at base; hairs of whorls sparse, moderate, black. Clypeus roundedly subconical, blackish with a white pruinosity, nude. Eyes black. Occiput black, broadly clothed with rather broad curved scales, in the middle broadly white and posteriorly with numerous, poorly differentiated, forked white scales, at the sides pale brown and with slender, erect, forked black scales; cheeks clothed with flat white scales inclosing a small patch of black ones well up the sides; setæ along margins of eyes black, those projecting between the eyes pale.

Prothoracic lobes elliptical, remote dorsally, black, clothed with whitish scales and black bristles. Mesonotum black, densely clothed with coarse, narrowly lanceolate scales, white and with a dark pattern, consisting of a median, deep bronzy-brown stripe of very narrow scales, narrow anteriorly and widened at right angles at the posterior third to occupy nearly the whole surface, leaving only a narrow white margin, scales on posterior portion of pattern black; some white scales around the antescutellar space. Scutellum trilobate, gray, clothed with lanceolate whitish scales, each lobe with a group of black bristles. Postnotum elliptical, prominent, blackish with a white pruinosity, nude. Pleuræ brown, coxæ lighter, clothed with patches of broad, flat white scales and rows of small pale bristles; epimera of prothorax clothed with brown scales like those on mesonotum.

Abdomen subcylindrical, flattened, the posterior segments tapering; dorsal vestiture black with a few white scales intermixed, especially on the apical margins of the posterior segments, each segment with a very broad basal white band of ragged outline and joined to lateral basal patches; first segment white scaled

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and with many pale setæ; venter largely white scaled, posterior angles black and on the posterior segments joined to a median black mark. Cerci black.

Wings broad, slightly infuscated, especially on the costa; petiole of second marginal cell shorter than its cell, that of second posterior cell about equal to its cell; basal cross-vein rather less than its own length distant from anterior cross-vein; scales of the veins very broad, triangular, black and white evenly intermixed, the black ones much the more numerous except on the subcostal vein; outstanding scales comparatively small, lanceolate; fringe unicolorous, blackish. Halteres whitish, with white scaled black knobs.

Legs moderate; femora largely white scaled intermixed with black ones, which predominate on upper side and towards tip; knees white; tibiæ black and white scaled nearly evenly intermixed, hind tibiæ blackish towards tip; tarsi black with white basal rings, first joint with many yellowish white scales intermixed, particularly at base and beneath, the other joints black with a broad white basal ring; fore and middle tarsi with narrower rings, the last two joints of the fore and the last of the middle ones entirely black. Claw formula, 1.1–1.1–1.1.

Length: Body about 5.5 mm.; wing 5 mm.

Male.—Proboscis moderate, straight. Palpi longer than the proboscis, the last two joints thickened; vestiture black, the long joint broadly banded with white at middle, a large white mark near base and at apex; last two joints largely white scaled except at tip; long hairs at end of long joint and on last two joints black and yellowish. Antennæ plumose, the last two joints long and slender, black, rugose, pilose, the others white, brown at enlarged insertions of hair-whorls; hairs of whorls long, dense, brown with yellowish luster. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture less abundant. Abdomen elongate, depressed, straight-sided, the segments more heavily banded with white at base; lateral ciliation long, abundant, pale yellowish. Claw formula, 1.1–1.1–1.1.

Length: Body about 7 mm.; wing 5 mm.

Genitalia (plate 27, fig. 187): Side-pieces over twice as long as wide, rounded at tip; distal lobe rounded, very prominent, situated slightly subapically, basal lobe quadrately expanded, with many small setæ and a stout spine at the base. Clasp-filament long and slender, slightly enlarged medianly, serrate, with three small setæ towards tip, a long terminal articulated spine. Harpes elliptical, concave, inner margins thickened and revolute, apex narrowed and terminating in a point which is bent outward. Harpagones with a slender columnar stem, slightly curved, with a stout seta near the base and a long terminal filament, broadly spatulate with a slender tip. Unci approximate, revolute, forming a narrow, slender cylinder with rounded tip. Basal appendages small, bearing several stout setæ.

Larva, Stage IV (see figure of the entire larva, plate 69).—Head rounded, widest through eyes, a notch at insertion of antennæ, the front margin broadly arcuate. Antennæ slender, slightly curved, well spined, a small tuft a little before middle; three irregular spines, a stout spine, and a digit on a pedicel at tip. Upper pair of dorsal head-hairs in fours or fives, lower pair in threes; ante-antennal tufts multiple, large. Mental plate long and triangular, with a central tooth and ten on each side, the basal ones more remote and pointed. Mandible quadrangular, spined outwardly at base; two filaments before tip; an outer row of cilia from a collar; a dense row of filaments on outer margin; dentition of four teeth on a process, the first the longest; a broad spine before, a double tooth at base, a broad, smooth filament and row of feathered filaments within; process below widely furcate, with a row of hairs on outer margin and a tuft at tip of each limb; basal angle distinct; a row of hairs with one detached within and a basal row. Maxilla subspherical, divided by a suture; inner half with a row of stout spines on margin, becoming long towards apex and replaced

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by hairs at base, two rows of cilia within; a tuft of long hairs at tip; outer half with two filaments near apex, a long spine close to the apical tuft and a short one below on the margin; surface covered with long hairs; palpus moderate, rounded, with four small irregular apical digits. Thorax transverse, rounded; hairs abundant but rather short, the prothoracic subdorsal ones in twos. Skin smooth. Abdomen rather long; hairs moderately developed, the laterals in twos on segments three to six, the subdorsal ones simple and rather long on segments four and five. Tracheæ broad. Lateral comb of eighth segment of many scales in a patch. Air-tube rather slender, about four times as long as wide, tapered outwardly; pecten reaching beyond basal third, of evenly spaced teeth, a small tuft beyond, near middle. Anal segment longer than wide, the dorsal plate reaching half-way down the sides, its lateral margins excised; dorsal hairs a long hair and a tuft on each side; lateral hair small, single. Ventral brush well-developed, the barred area preceded by a series of smaller tufts. Anal gills longer than segment, tapered.

Egg (plate 147, fig. 683).—Fusiform, slightly flattened on one side, the sculpture of hexagonal reticulations elongated lengthwise, black, a gelatinous cushion at the micropylar end.

The eggs are laid separately. The species apparently has but a single brood, the larvæ appearing in the spring in transient puddles. Professor Smith's experience with this species in New Jersey, known to him at the time as *Culex squamiger,* is as follows:

"Full-grown larvæ were found by Mr. Grossbeck, April, 1903, near Paterson, with *canadensis.* The larvæ were recognized as distinct, but were not bred. April 25th, Mr. Van Duersen brought in four well grown larvæ from swampy woods near New Brunswick; but these also failed to develop. May 2d, another lot of mixed larvæ was brought in, mostly *canadensis.* Pupation began May 3d, and a male *squamiger* emerged May 8th, though possibly not from the first pupa. Additional collections were made May 16th, mostly pupæ and mostly *canadensis;* but in two days fourteen specimens, nearly equally divided as to sex, were bred out. Though this territory was collected over many times later in the season and several other species were found, no further trace of *squamiger* appeared. It is probable, therefore, that only one brood occurs, and that very early in the season. Nothing is known of the egg-laying habits nor of the method of hibernation, but from their early date of appearance and their constant association with *canadensis,* it is probable that the eggs winter like and with those of its associate."

Professor Smith further remarks that the period through which the female imagos have been found indicates an individual life of about three months. The species is rare.

Eastern United States from New Jersey to Mississippi.

New Brunswick, New Jersey, May 17 (J. A. Grossbeck); Livingston Park, New Jersey, May 5 (J. A. Grossbeck); Elizabeth, New Jersey, May 28, 1906 (D. S. Carmody); Baltimore, Maryland (T. H. Coffin); Grassymead, Virginia, June 19, 1906 (F. Knab); Natchez, Mississippi, April, 1903 (A. Fleming).

Aëdes grossbecki was for some time considered identical with *A. squamiger* of the Pacific Coast. It is however abundantly distinct in coloration of the imago, structure of the male genitalia and larva, and in habits. Professor Smith, in figuring the male claws, shows two teeth on one of the front claws; in our only male specimen, a cotype of *sylvicola,* all the claws are armed with but a single tooth.

AËDES RIPARIUS Dyar & Knab.

Aëdes riparius Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 213, 1907.
Aëdes riparius Gibson (in part), Rept. Ent. Soc. Ontario, 1908, 109, 1909.
Aëdes riparius Theobald, Mon. Culic., v, 485, 1910.

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ORIGINAL DESCRIPTION OF AËDES RIPARIUS:

♀.—Proboscis slender, dark scaled with a sprinkling of lighter yellowish scales, particularly towards the base; palpi short, dark scaled, with the apex and the median segments lighter scaled; occiput yellow scaled with brassy luster, a large brown spot on each side of the middle and another one well down the side; prothoracic lobes yellow scaled; mesonotum bright ferruginous brown with silky luster, at the bases of the wings and on the antescutellar area light yellow scaled, two submedian narrow longitudinal yellow lines reach the base on each side of the antescutellar area; scutellum yellow scaled, the setae abundant and concolorous with the scales; metanotum brown; postscutellum clothed with dull yellowish white scales and with pale hairs; abdomen clothed principally with light scales above, at the bases of the segments the scaling is dull yellowish white and shades off into a light ferruginous on the lighter scales, on the apical two-thirds of the segments there is a strong sprinkling of dusky scales which becomes predominant on the second, third and fourth segments, beneath the abdomen is entirely yellowish white scaled; legs with the femora and tibiae pale ochreous scaled with a sprinkling of blackish scales which becomes very heavy at the apices, particularly on the tibiæ; tarsi black, with very broad basal yellowish white rings. Claws all toothed. Wing-scales brown, heavily sprinkled with yellow ones in the costal region, the scales long and narrow. Length 5.5 mm.

♂.—Palpi slightly longer than the proboscis, clothed with dusky and yellowish scales, which latter tend to form bands, the apical half densely clothed with brown and pale ferruginous hairs with a silky luster; abdomen long and slender, the apical half depressed, the marginal cilia long and dense, pale yellow. Length, 6 mm.

Sixty-eight specimens, Winnipeg, Manitoba, Canada (F. Knab), found along the banks of the Assiniboine River, among the trees. The female bites both by day and night.

Type.—No. 10875, U. S. National Museum.

DESCRIPTION OF FEMALE AND MALE OF AËDES RIPARIUS (LARVA UNKNOWN):

Female.—Proboscis moderate, uniform, the labellæ conically tapered; vestiture black intermixed with dull yellowish-white scales which almost form a band on central half; setæ minute, curved, black, those on the labellæ more prominently outstanding. Palpi short, about one-fourth as long as the proboscis, clothed with black and a few whitish scales at apices of joints; setæ moderate, black. Antennæ with the joints subequal, rugose, pilose, black, the second joint somewhat larger, brown at its base; hairs of whorls sparse, moderate, black; tori subspherical, with a cup-shaped apical excavation, brown, on inner side shading to black and with a patch of small white scales. Clypeus rounded triangular, prominent, dark brown, nude. Eyes black. Occiput black; vertex densely and broadly clothed with narrow, curved scales, golden yellow in the middle, a patch of brown ones laterally, a black quadrate spot well down on the side, on vertex many slender erect truncate or notch-tipped black scales, the median ones pale; cheeks clothed with flat yellowish white scales.

Prothoracic lobes elliptical, remote dorsally, clothed with golden-brown scales and black bristles. Mesonotum blackish brown, clothed with narrow, curved scales, bright reddish golden brown medianly, straw-colored on the sides and around the antescutellar space, broadly over the roots of the wings and in a narrow stripe each side of the antescutellar space. Scutellum trilobate, clothed with narrow, curved pale golden scales, each lobe with a large group of pale bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ brown, coxæ luteous, clothed with elliptical flat white scales; prothoracic epimera clothed with golden brown scales similar to those on mesonotum.

Abdomen subcylindrical, tapering posteriorly; dorsal vestiture of pale brownish-yellow and black scales, the segments black scaled in the middle, pale at bases and tips, with many pale scales scattered throughout the black portion, the pale scales largely predominating on the last two segments; first segment white scaled and with many pale setæ; venter almost wholly dull yellowish white scaled, an indistinct, ragged, median black line in some specimens. Cerci black.

Wings moderate, slightly infuscated; petiole of second marginal cell shorter

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than its cell, that of second posterior cell shorter than its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales on costa and first veins small and narrowly triangular, black and yellowish-white evenly intermixed; on the other veins the outstanding scales are long, broadly linear to narrowly ligulate, almost wholly blackish, a few pale ones intermixed. Halteres pale.

Legs moderately long; femora yellowish-white scaled beneath, black and whitish evenly intermixed above; knees yellowish-white; tibiæ similar, with more black scales, these predominating on upper side, the pale ones forming a line on inner surface, hind pair black at tips; hind tarsi with second to fifth joints black and broadly white-ringed at bases, first joint not distinctly ringed but with the yellowish scales predominating nearly to tip; pale rings on front and middle tarsi narrower, the last joint wholly black. Claw formula, 1.1–1.1–1.1.

Length: Body about 5.5 mm.; wing 5 mm.

Male.—Proboscis slender and straight. Palpi slightly exceeding the proboscis, slightly swollen apically; end of long joint and the last two joints with long black and yellowish hairs; vestiture of black and pale scales intermixed, the black scales predominating at apices, the pale scales at bases of joints; long joint black with a distinct median white ring and patches of white scales towards base and subapically. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, pale, with dark, enlarged, annular insertions of hair-whorls; hairs of whorls long, dense, brown with yellowish luster. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture sparse. Abdomen elongate, depressed, the pale scales yellowish white and massed basally and laterally; lateral ciliation long, abundant and pale. Claw formula, 1.1–1.1–1.1.

Length: Body about 6 mm.; wing 5 mm.

Genitalia (plate 26, fig. 179): Side-pieces three times as long as wide, rounded at tips; apical lobe developed, separated from basal one; basal lobe a long stout conical prominence, densely setose, without a thick spine. Clasp-filament long, slender, uniform, with three small setæ outwardly near tip and a long articulated terminal spine. Harpes elliptical, margins revolute, tip pointed and bent. Harpagones with long, slightly curved columnar stem and terminal, long and rather broad filament of nearly uniform width. Basal appendages small, rounded, bearing stiff spines.

The larval habits have not been observed, but the data indicate development in the snow-water pools of early spring. Mr. Knab, at Winnipeg, found males still present late in June and the females abundant and in fresh condition; they were taken in woods along the banks of the Assiniboine River. The females bite both by day and night.

Manitoba and central northern United States.

Winnipeg, Manitoba, June 21 and 22, 1907 (F. Knab); Aweme, Manitoba, June 2, 1904, June 24, 1907 (N. Criddle); Saxeville, Wisconsin, June 2, 1909 (B. K. Miller).

AËDES EUEDES, new species.

Aëdes riparius Gibson (in part), Rept. Ent. Soc. Ontario, 1908, 109, 1909.

DESCRIPTION OF FEMALE AND MALE OF AËDES EUEDES (LARVA UNKNOWN):

Female.—Proboscis moderate, uniform, the labellæ conically tapered; vestiture black, with a sprinkling of lighter scales; setæ minute curved, black, those on the labellæ more prominently outstanding. Palpi about one-fourth as long as the proboscis, clothed with black scales and some scattered white ones, the setæ moderate, black. Antennæ with the joints subequal, rugose, pilose, black, second joint somewhat larger, pale ferruginous; hairs of whorls rather short, sparse, black; tori subspherical, with a cup-shaped apical excavation, luteous, on inner side shading to brown and with a patch of small white scales. Clypeus

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rounded-triangular, prominent at base, dark brown, nude. Eyes black. Occiput piceous, clothed with narrow curved scales, creamy-white in the middle, brown at the sides, many erect truncate or notch-tipped scales, the median ones pale, those at sides dark; sides and cheeks clothed with flat yellowish white scales and enclosing a small brown patch.

Prothoracic lobes elliptical, remote dorsally, clothed with whitish scales and black bristles. Mesonotum dark brown, clothed with narrow curved scales, creamy-white, a median dorsal stripe of golden brown ones, hardly one-third the width of disk, reaching back to the antescutellar space; some golden-brown scales intermixed laterally among the creamy ones; the lateral margins narrowly golden-brown scaled. Scutellum trilobate, clothed with creamy white scales, each lobe with a group of pale brown bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ brown, coxæ luteous, clothed with elliptical, flat, white scales; prothoracic epimera clothed mostly with narrow, curved, yellowish scales, like those on sides of mesonotum.

Abdomen subcylindrical, tapering posteriorly; dorsal vestiture of dirty yellowish white and dull blackish scales, the pale scales tending to form indistinct basal and apical bands on the segments, and also scattered among the black ones, on some segments showing a tendency to form a median stripe; first segment with a patch of creamy white scales and many pale setæ; venter almost wholly pale-scaled. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell about equal to its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales on the veins dark brown with dull yellowish white ones intermixed on all the veins, the pale ones most abundant on subcostal and first veins, the outstanding scales broadly linear to narrowly ligulate. Halteres pale, with dark knobs.

Legs moderate; femora creamy-white scaled beneath, black and white intermixed above, darker towards apices; knees yellowish white; tibiæ clothed with pale yellow and black scales, the latter predominating dorsally; tarsi black with white basal rings; first joints with yellowish scales predominating on basal two-thirds, but not distinctly ringed; hind tarsi with broad white rings at bases of all the joints; front and mid tarsi with moderate basal white rings and the last joints all black. Claw formula, 1.1–1.1–1.1.

Length: Body about 5.5 mm.; wing 5 mm.

Male.—Proboscis long, slender and straight. Palpi exceeding the proboscis by nearly the length of the last joint; end of long joint and last two joints somewhat swollen and densely clothed with long brownish-yellow hairs; vestiture of black and creamy scales intermixed, the black scales predominating at apices, the pale scales at bases of the joints; long joint with a median pale ring and a pale spot near base and subapically. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, pale, with dark annular enlargements at insertions of hair-whorls; hairs of whorls long, dense, golden and brown. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture sparse. Abdomen elongate, depressed, the pale scales more numerous; lateral ciliation long, pale brown. Claw formula, 1.1–1.1–1.1.

Length: Body about 7 mm.; wing 5.5 mm.

Genitalia (plate 28, fig. 191): Side-piece three times as long as wide, tips rounded; apical lobe developed, prominent, rounded; basal lobe large, flat, scarcely at all raised, covered with small setæ arising from tubercles, and without stout spine. Clasp-filament moderate slender, uniform, with three setæ on outside near tip and a terminal long articulated spine. Harpes elliptical, with revolute margins, tip thick and hooked. Harpagones with long slender stem

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and terminal filament nearly as long as the stem, the filament slightly widened in the middle. Unci forming a small basal cylinder with two points. Basal appendages small, rounded, with several stout setæ.

Type: No. 12272, U. S. Nat. Mus.

Life history and habits unknown.

Eastern Ontario, Canada.

Ottawa, June 1 and 11, 1900 (J. Fletcher); Trenton, Ontario, May 24, 1900 (J. Fletcher).

Aëdes euedes is closely allied to *Aëdes riparius*, but differs in the color of the scales on the mesonotum. We have received it from eastern Ontario only, *riparius* occurring farther west.

AËDES EUOCHRUS, new species.

DESCRIPTION OF FEMALE OF AËDES EUOCHRUS (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderate, uniform, labellæ conically tapered; light ferruginous, the vestiture of ocherous yellow scales; setæ minute, curved, yellow. Palpi about one-fourth as long as the proboscis, clothed with ocherous yellow scales, the apices whitish, the setæ moderate, pale. Antennæ with the joints subequal, rugose, pilose, brownish yellow, second joint somewhat larger, ocherous; hairs of whorls rather short, sparse, light brown; tori subspherical, with a cup-shaped apical excavation, luteous brown. Clypeus rounded triangular, prominent at base, luteous brown, nude. Eyes black. Occiput brown, clothed with narrow, curved, light ocherous scales; many erect, slender, forked, light ocherous scales; cheeks with broad flat whitish scales; hairs along margins of eyes brownish yellow, those projecting between eyes yellowish white.

Prothoracic lobes elliptical, remote dorsally, light brown, clothed with lanceolate pale scales and yellow-brown bristles. Mesonotum light ocherous brown, clothed with lanceolate, curved, pale-ocherous scales, paler around the antescutellar space, and with brownish yellow setæ, which are abundant above roots of wings. Scutellum trilobate, clothed with narrow, curved, whitish scales, each lobe with a group of yellowish brown bristles. Postnotum light brown, elliptical, prominent, nude. Pleuræ light brownish yellow, coxæ luteous, with patches of elliptical whitish scales.

Abdomen subcylindrical, tapering posteriorly; dorsal vestiture of dull ocherous scales, the segments with very broad, ill-defined, basal bands of dull creamy-white scales, but slightly paler than the general coloring, dilated at sides of segments to near apical angles, fourth segment nearly wholly pale scaled; venter creamy-white scaled. Cerci brown.

Wings moderate, hyaline; petiole of second marginal cell considerably shorter than the cell, that of second posterior cell about equal to its cell; basal cross-vein distant slightly more than its own length from anterior cross-vein; scales of veins ocherous yellow, the outstanding ones ligulate, denser and slightly broadened towards apex of wing. Halteres pale, with yellowish knobs.

Legs moderate, ocherous-yellow scaled; femora paler beneath and at base; tarsal joints with narrow whitish rings at their bases, obsolete on last two joints of front and middle pairs and on last joint of hind ones. Claw formula, 1.1–1.1–1.1.

Length: Body about 6 mm.; wing 5 mm.

Type: No. 12057, U. S. Nat. Mus.

The larva and the life history and habits are unknown.

British Columbia.

Popcum, August 2, 1903 (J. Fletcher).

Described from a single female sent by Dr. Fletcher, pinned on the same pin with two specimens of a black-legged *Aëdes* allied to *lazarensis*, which we are not able to identify positively.

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AËDES TESTACEUS (van der Wulp).

Culex testaceus van der Wulp, Tidschr. voor Ent. (2), x, 128, 1867.
Culex testaceus Giles, Gnats or Mosq., 310, 1900.
Culex testaceus Theobald, Mon. Culic., i, 409, 1901.
Culex testaceus Giles, Gnats or Mosq., 2 ed., 418, 1902.
Culex testaceus Blanchard, Les Moust., 274, 1905.
Ochlerotatus testaceus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.
Culex testaceus Theobald, Mon. Culic., v, 347, 1910.

ORIGINAL DESCRIPTION OF CULEX TESTACEUS:

Testaceus; thorace subvittato; abdomine linea laterali nigricante; pedibus lutescentibus; alis immaculatis. ♂ long. 2¾ lin.

Kop donkerbruin; schedel en achterhoofd met grove, bruine beharing. Sprieten lichtbruin, zwartachtig geringeld; de vederbos lichtbruin met bleekgelen weerschijn. Zuiger langer dan de kop en thorax, in 't midden lichtbruin, aan den wortel en de spits donkerder. Voelers lichtbruin, de spits der geledingen donker; het tweede lid het langst, ongeveer een derde langer dan het eerste; de beide laatste leden ieder ter halver lengte van het tweede lid; van digt voor de spits van het tweede lid tot een weinig voor het uiteinde is aan de onderzijde eene aaneengeschakelde, digte, vrij lange beharing van donkerbruine kleur, met bruingelen weerschijn; van boven en aan de uiterste spits eene borstelige, minder digte beharing. Thorax van boven donker geelbruin; de schubachtige beharing, waarvan de topjes goudgeel zijn, wijzigt eenigzins de grondkleur en laat een paar onduidelijke langsstrepen vrij; het schildje deelt in de kleur en beharing van den thorax; borstzijden en achterrug geelbruin; boven de achterste heupen een vlekachtige, geelachtig witte weerschijn. Achterlijf platgedrukt, geelbruin, aan wederzijden met zwartachtige zijstreep, die vooral aan de laatste ringen duidelijk wordt en daar ook eenigzins eenen achterzoom vormt; de laatste ring bijna geheel zwartbruin; de tang korter dan die ring, geelbruin; beharing des achterlijfs matig lang en digt, geelachtig. Pooten en kolfjes vrij helder bruingeel. Vleugels met geelachtige tint; de aderen en schubben lichtbruin; de bovenste basaal-cel langer dan de onderste.

Aëdes testaceus is autoptically unknown to us. The larva and the life history and habits are unknown.

Reported from Wisconsin.

Van der Wulp describes this species from a male taken in Wisconsin. His description is unrecognizable and was apparently drawn from a badly abraded specimen. He makes no mention of pale rings on the legs. We think that Theobald's identification of a female from Ontario, with pale rings at the bases of the first two hind tarsal joints, with this species is a somewhat violent one, and we prefer to let the name stand unidentified. The only hope of definitely identifying the species is by a study of the genitalia of the type-specimen. We are unable to determine from Theobald's description what species he had before him under the name *testaceus*.

AËDES FLUVIATILIS (Lutz).

Culex fluviatilis Lutz in Bourroul, Mosq., do Brasil, 42, 72, 1904.
Culex fluviatilis Lutz, Imprensa Medica, Nov. esp. de mosq. do Brasil, species no. 3, 1905.
Gualteria fluviatilis Lutz, Imprensa Medica, 65, note, 1905.
Hæmagogus fluviatilis Dyar & Knab, Proc. Biol. Soc. Wash., xix, 166, 1906.
Danielsia mediomaculata Theobald, Mon. Culic., iv, 245, 1907.
Culicada fluviatilis Theobald, Mon. Culic., iv, 342, 1907.
Aëdes lithoecetor Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 201, 1907.
Danielsia mediomaculata Peryassú, Os Culicid. do Brazil, 174, 1908.
Gualteria fluviatilis Peryassú, Os Culicid. do Brazil, 45, 181, 1908.
Aëdes lithoecetor Busck, Smiths. Misc. Colls., quart. iss., iii, 64, 1908.
Danielsia mediomaculata Theobald, Mon. Culic., v, 244, 1910.
Aëdes lithoecetor Theobald, Mon. Culic., v, 599, 1910.
Culicada fluviatilis Theobald, Mon. Culic., v, 302, 1910.
Gualteria fluviatilis Theobald, Mon. Culic., v, 607, 1910.

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ORIGINAL DESCRIPTION OF CULEX FLUVIATILIS:

MACHO: Comprimento total 6 mm., menos a tromba que tem quasi 2 mm.

Tromba—Preta, delgada, de grossura egual, com apex ligeiramente entumescido, coberta de escamas pouco salientes escuras mas com brilho de bronze e pellos muito finos, curtos e espaçados, um pouco mais desenvolvidos nos labellos, que têm brilho de bronze ou prata; um pouco mais curto do que o abdomen.

Palpos—Maiores do que as antennas, porém um pouco mais curtos que a tromba, de côr escura mais bronzeada na extremidade; os 3 ultimos articulos com a base branco-amarellada no lado dorsal e, no ante-penultimo, tambem do lado ventral, o segundo articulo maior com muitas escamas brancas tanto em cima como em baixo, os dous ultimos e o apex do antepenultimo guarnecidos de pellos compridos e escuros e com brilho de bronze claro na extremidade.

Antennas—Tóros ochraceos um pouco ennegrecidos; muito plumosas, os pellos escuros com brilho prateado, os ultimos articulos sem pellos maiores, eguaes ao resto das antennas; os 2 ultimos articulos, principalmente o penultimo, muito compridos, com pellos finos prateados, de comprimento quasi egual ao resto das antennas; na face interna da base dos tóros e dos flagellos ha uma côr de marfim velho; os segmentos com anneis articulares mais claros.

Clypeus—Preto.

Occiput—Fundo escuro, na linha mediana com escamas fusiformes estreitas compridas e curvadas, mais para tras tornam-se misturadas com outras mais compridas erectas espatuladas com ponta bifurcada; para fóra as escamas tornam-se largas e espatuladas com o apex alargado e arredondado; a cor das escamas é amarella com brilho ora esbranquiçado ora dourado claro e, ás vezes, bronzeado mais ou menos escuro.

Prothorax—Pellos claros e escamas claras obovaes de cor crême.

Mesonotum—Fundo pardo com brilho desnudado; ha 3 linhas castanho-escuras das quaes a mediana é mais pronunciada; macroscopicamente o mesonotum é dourado na metade, ou nos ⅔ anteriores e mais escuro para traz; as escamas são aconchegadas, fusiformes, estreitas, compridas e curvadas; nos ⅔ anteriores cor de ouro claro, no ⅓ posterior são menos abundantes e em parte mais escuras, com brilho bronzeado; ha, porém, entre ellas alguns feixes de escamas quasi brancas.

Scutellum—Escamas quasi brancas, havendo no lobo mediano pelo menos 8 pellos grossos e compridos.

Metanotum—Liso, castanho escuro, mas com brilho claro.

Pleuras—Com 5 a 6 pequenos grupos de escamas chatas largas, de forma oboval ou espatulada e côr branca nacarada; outras escamas eguaes existem na parte anterior das coxæ.

Abdomen—Em cima, uma estria mediana clara interrompida, formada por manchas lineares ás vezes alargadas na base e occupando ⅔ dos segmentos; ha uma indicação de faxas transversaes basaes estreitas, mais apparentes nos primeiros segmentos.

Pelo resto as escamas são escuras com brilho azulado, sendo os pellos terminaes dos segmentos de côr amarella clara; em baixo predominam escamas chatas, branco-amarelladas, mas ha faxas escuras terminaes, finas no meio e lateralmente alargadas, á medida que se approximam da extremidade posterior; a parte branca, mais larga na base dos segmentos, é limitada por uma linha em zig-zag pouco regular.

Asas—Escamas do typo de culex, bastante aconchegadas; a primeira cellula forqueada mais comprida e estreita que a segunda; o primeiro pedunculo quasi a metade, o segundo egual ao comprimento da cellula respectiva; veias transversaes *a* e *b* encontram-se em angulo muito obtuso, aberto para a base, da qual *c* se approxima por pouco mais do seu comprimento.

Halteres—Esbranquiçados; capitulo com escamas brancas.

Pernas—Escuras, sendo os femora branco-amarellados na base e em baixo até além do meio; todos os articulos têm uma faxa clara situada na parte articular distal, com excepção dos joelhos onde ambas as extremidades são branco-amarelladas; os metatarsos um pouco mais claros, principalmente do lado inferior. Unhas dos dois pares anteriores, desiguaes: todas com dente basal; as do ultimo par, eguaes e pequenas.

O segundo articulo do apparelho prehensivo do macho é formado por uma pinça muito fina, comprida e curvada. A femea mostra as differenças usuaes nos palpos, antennas, unhas e partes sexuaes.

As larvas, de habito palustre, conhecem-se facilmente pela estructura do tubo respiratorio—curto, largo e conico, mais curto do que os appendices bronchiaes. Na base começam duas series de 3 a 18 dentes, com algumas pontas, conforme a idade; mais para cima de cada uma destas series ha um feixe formado por 8 pellos, distinctamente pennados. A pelle é lisa; as antennas muito simples e curtas são de todo escuras e a sua ponta não alcança a base dos styll prae-orales.

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ORIGINAL DESCRIPTION OF DANIELSIA MEDIOMACULATA:

Head pale creamy grey with a brown area at each side; proboscis and palpi dark brown. Thorax with bright creamy grey scales, almost silvery. Abdomen deep brown with a median pale area on each segment, uniting with one another to form a median pale line. Legs deep brown with narrow basal pale bands. Fork-cells of wings short. Male palpi brown, nearly as long as the proboscis.

♀. Head clothed with rather loosely appressed flat creamy scales, and then towards the eyes a broad line of brown ones on each side, around the eyes a rim of narrow-curved creamy ones and some narrow-curved ones behind in the mid region, a number of pale ochreous and brown upright forked scales behind; the occipital scales show a median parting and divergent opening in front; chaetae pale golden-brown; proboscis deep brown, also the short, thick palpi, which show bronzy reflections; antennæ brown, base of second segment bright testaceous.

Thorax rich brown clothed with bright creamy narrow-curved scales rather irregularly disposed and with golden-brown chætæ; scutellum with similar scales and brown border-bristles; metanotum deep brown; pleuræ brown with patches of flat pale creamy scales.

Abdomen deep blackish-brown, each segment with a median pale creamy area, which all unite to form a median pale line, and with basal lateral pale creamy spots; first segment pale testaceous with a median patch of creamy scales and two lateral patches of black scales, border-bristles pale.

Legs deep brown, femora pale at the base and beneath, the fore and mid legs bare, pale bands at the base of the first tarsals and involving the joints of the next two tarsals and to some extent the third, in the hind legs the banding is more pronounced and extends to the last tarsal, which is dark apically; fore and mid ungues equal and uniserrate, hind equal and simple. The leg banding is mainly basal, but to some extent involves both sides of the joints—knee spots present.

Wings with short fork-cells; the first sub-marginal considerably longer and narrower than the second posterior cell, its base nearer the base of the wing, the cell about two and a half times the length of the cell; stem of the second posterior two-thirds the length of the cell; posterior cross-vein parallel with the mid, a little more than its own length distant from it.

Halteres thick, with pale stem and fuscous knob.

Length.—5 to 5.8 mm.

♂. Head-scales paler, almost white, with two black patches and dark at the sides, scales and parting just as in ♀. Palpi deep brown, with a trace of a pale band towards the base, the two apical segments nearly equal and with dense brown hair-tufts, also on the apex of the antepenultimate segment; proboscis black, thin, just a little longer than the palpi.

Legs as in the ♀; fore and mid ungues unequal, uniserrate, hind equal and simple. Claspers of the genitalia long with a long thin apical segment, *curved up over the back.*

Length.—5.5 mm.

Habitat.—Para, Brazil (Dr. Goeldi).

Observations.—Described from a perfect ♂ and ♀ sent in a collection by Professor Goeldi.

It is a very marked species, easily told by the median abdominal spots, which form a more or less pronounced median pale line.

The character of the ♂ genital claspers turning up also seems characteristic, and the banded legs at once separate it from the somewhat similar *albifasciatus* of Macquart.

ORIGINAL DESCRIPTION OF AËDES LITHOCECTOR:

♀.—Proboscis moderately long, rather slender, black scaled; palpi short, black scaled; occiput clothed with pale-yellowish scales, narrow curved ones on the vertex, flat ones on the sides, a small black patch on the lower part of the side; mesonotum with the anterior two-thirds clothed with shining light-yellow scales, a dark patch in front of the sides, posterior portion varied with blackish and pale-yellowish scales, a patch at the side separated by a yellow stripe running from the middle to the base of the wing; scutellum yellow scaled; pleura dark with patches of white scales; mesonotum deep brown, nude; abdomen black-scaled above with median basal elongate creamy spots on all the segments, which however do not unite to form a stripe, segments with lateral triangular basal white patches, beneath the abdomen is mostly creamy white with black apical lateral triangular marks; legs black, knees yellow scaled, tarsi with narrow yellowish-white basal rings, the ring at the base of the second tarsal of the hind legs slightly involves the apex of the first joint; fork-cells rather short, scales of the veins all dark, claws of front and mid legs toothed, of hind legs simple. Length, 5 mm.

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♂.—Palpi slightly shorter than the proboscis, hairy on the apical portion, the two apical segments light ringed at their bases; abdomen with distinct basal white bands on the second to fourth segments, on the succeeding segments broken into three spots, the median spot becoming elongate on the sixth and seventh segments, lateral cilia abundant, pale. Length, 4 mm.

Five specimens, Chagres River, Panama (August Busck, collector), bred from larvæ in pot-holes along the river.

Type.—No. 10868, U. S. National Museum.

Apparently nearly allied to *Danielsia tripunctata* Theobald and to *Danielsia mediomaculata* Theobald, the abdominal marking differing from the former and the thoracic marking differing from the latter. We would place *Danielsia* Theobald as a synonym of *Aëdes* in our classification.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES FLUVIATILIS:

Female.—Proboscis rather long and slender, uniform, the labellæ conically tapered; vestiture black; setæ minute, curved, black, those on the labellæ more prominently outstanding. Palpi one-fifth as long as the proboscis, black scaled. Antennæ moderate, the joints subequal, rugose, piloæ, black, second joint slightly enlarged, yellowish; hairs of whorls short, sparse, black; tori subspherical, with a cup-shaped apical excavation, luteous, a patch of small white scales on inner side. Clypeus rounded triangular, elongate, dark brown, nude. Occiput broadly clothed with narrow, curved, dull creamy somewhat lustrous scales and some erect forked ones on the nape of the same color, a few black erect forked scales laterally; sides and cheeks clothed with flat creamy scales enclosing a large diffuse patch of darker ones; bristles along margins of eyes black, those projecting between the eyes pale yellow.

Prothoracic lobes elliptical, remote dorsally, clothed with pale scales and black bristles. Mesonotum dark brown, clothed with narrow, curved, straw-colored scales with silvery luster over anterior two-thirds and containing two small wedge-shaped brown stripes anteriorly, posterior third deep bronzy brown, more or less distinctly divided into patches by four lines of pale scales, the two larger patches on the sides reach to roots of wings; antescutellar space surrounded by pale scales. Scutellum trilobate, clothed with narrow curved pale scales, each lobe with a group of brown bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ and coxæ brown, clothed with elliptical, flat white scales and a few pale bristles; prothoracic epimera clothed with bronzy brown scales like those on mesonotum.

Abdomen subcylindrical, depressed, tapering towards tip; dorsal vestiture of black scales with violet and bronzy reflection, each segment with a narrow median elongate patch of whitish scales, the patches forming a median stripe, broken at apices of segments, the spots on last two segments nearly continuous; also more or less distinct basal segmental pale bands, sometimes wanting, generally joined to a series of large, pure white, lateral patches; venter yellowish white scaled.

Wings moderate, hyaline; petiole of second marginal cell about one-half as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant about its own length from anterior cross-vein; scales of veins blackish brown, the outstanding ones broadly linear, long. Halteres whitish, with black knobs.

Legs moderate, rather slender; vestiture brownish black; front and middle femora broadly whitish beneath basally, hind femora wholly pale on basal half; knees whitish; hind tarsi with narrow white rings at bases of all the joints; first joint narrowly white marked at apex; two last joints of fore tarsi and last of mid tarsi not ringed. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Male.—Proboscis moderately long, straight. Palpi three-fourths as long as the proboscis; apex of long joint and last two joints slightly swollen and bearing many long, coarse, black hairs; vestiture bronzy-black with a few whitish scales

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dorsally at bases of last two joints, no pale ring at middle of long joint. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short and slightly thickened at insertions of hair-whorls; hairs of whorls long, dense, brown with yellowish luster. Coloration similar to the female. Wings not much narrower than in the female, the stems of the fork-cell about the same; vestiture less abundant. Abdomen elongate, depressed; basal bands a little broader than in the female, the series of median spots obsolescent; lateral ciliation abundant, rather short, brown. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 32, fig. 215): Side-pieces over twice as long as wide, tips rounded; apical lobe undeveloped; basal lobe very slight, indicated by a row of setæ. Clasp-filament long, slender, uniform, slightly expanded just at base, with a long articulated terminal spine. Harpes broad, with revolute margins and bent pointed tip. Harpagones with columnar, minutely setose base, and long terminal filament, much longer than the basal column, slightly expanded outwardly. Unci forming a basal cylinder.

Larva, Stage IV (plate 117, fig. 401).—Head rounded, widest through eyes; antennæ rather small, slender, weakly spinulated, a double hair at middle; upper pair of dorsal head-hairs in threes, lower pair in twos, ante-antennal tufts of six hairs. Lateral abdominal hairs double on third to sixth segments. Tracheæ broad. Lateral comb of eighth segment of many scales in a large patch, each scale evenly spinulated around its apical margin. Air-tube more than three times as long as wide, thickest near base, somewhat tapered; pecten of fine dense teeth reaching to near middle, followed by a large, multiple hair-tuft. Anal segment longer than wide, with a dorsal plate extending well down the sides, irregular on its lateral margin; dorsal tufts a long hair and tuft on each side; lateral hair single, small, at the angle of the plate; ventral brush well developed, confined to the barred area. Anal gills about as long as the segment, equal, tapered.

The larvæ live in the water in pot-holes and hollows in rocks along the beds of streams. Peryassú states that he took the larvæ in brackish water, but does not say whether or not in a rock-hole. Mr. Jennings took the larvæ in salt and brackish pools in rocks above high-tide level as well as in fresh water along streams. Mr. Knab found them in fresh water in depressions on bowlders in a stream-bed, associated with *Aëdes epactius* and *Culex pinarocampa*.

Forested regions of tropical America, along rivers and sea-coast.

Córdoba, Mexico, larvæ January 4, 1908 (F. Knab); Bluefields, Nicaragua (W. F. Thornton); Caldera Island, Porto Bello Bay, Panama, January 4, April 8, 1908 (A. H. Jennings); Chagres River, Panama, May 20, 1907 (A. Busck). Reported also from City of Rio de Janeiro, State of Alagôas, State of São Paulo on the margin of the rivers Grande and Mogyassú, City of Bahia, Brazil (Lutz, Peryassú); Pará, Brazil (Theobald).

AËDES NUBILUS (Theobald).

Theobaldia atripes Neveu-Lemaire (not *Culex atripes* Skuse), Arch. Parasitol., vi, 615, 1902.
Culex nubilus Theobald, Mon. Culic., iii, 208, 1903.
Culex nubilus Blanchard, Les Moustiques, 629, 1905.
Ochlerotatus nubilus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 19, 1906.
Culex nubilus Theobald, Mon. Culic., v, 361, 1910.

ORIGINAL DESCRIPTION OF CULEX NUBILUS:

Head, thorax, abdomen and legs deep dusky brown; the abdomen with basal lateral dull creamy spots and dull creamy venter; thorax with small bronzy-brown scales. Legs and proboscis unbanded.

♀. Head dusky brown, with dusky narrow-curved scales behind, deep ochraceous ones in the middle in front and pale ochraceous ones around the eyes, black upright forked scales at the sides and behind, ochraceous ones in the middle in front; pro-

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boscis and palpi deep brown, the latter rather thick; antennae deep brown, except the basal joint and base of the second joint, which are bright testaceous, basal joint with black bristle-like hairs on the inside.

Thorax deep dusky brown, with narrow-curved scattered bronzy scales, with numerous black bristles in front and a few over the roots of the wings; scutellum brown, with numerous large and small border-bristles to the mid lobe; metanotum brown; pleurae brown, with patches of grey scales. Abdomen entirely covered with dusky-black scales, the segments with more or less marked yellowish-grey basal lateral spots; border-bristles dusky; venter with dull creamy grey scales and traces of dusky apical bands. Legs entirely brown, except the coxae and bases of the femora, which are pallid grey; ungues large, equal, all three pairs with a very large tooth.

Wings very slightly brown, with typical brown *Culex* scales; the fork-cells short; the first sub-marginal a little longer and narrower than the second posterior, its base about level with that of the latter, its stem about half the length of the cell; stem of the second posterior about two-thirds the length of the cell; posterior cross-vein longer than the mid, about two-thirds of its own length distant from it; halteres with pale ochraceous stem and slightly fuscous knob.

***Length.*—5 to 6 mm.**

***Habitat.*—British Guiana (Dr. Low).**

***Observations.*—Described from five ♀'s. They were taken in the bush on the Pomeroon mission and on the Christianburg River. The species is very distinct and can at once be told by the bristly basal antennal joint, its general dusky-brown appearance and markedly serrated ungues. One specimen shows the brown proboscis very dark at the apex. It bears some resemblance to *Gilesia aculeata*, Theobald.**

Dr. Low tells me it is a common forest species widely distributed in virgin forest in British Guiana.

DESCRIPTION OF FEMALE OF AËDES NUBILUS (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderate, subcylindrical, very slightly expanded at tip; vestiture black; setæ minute, curved, black, those on the labellæ more prominently outstanding. Palpi short, about one-fifth as long as the proboscis, slightly enlarged at tip, clothed with black scales and rather long black bristles. Antennæ with the joints subequal, black, rugose, pilose, second joint slightly stouter, yellow at base, somewhat bristly; tori subspherical, with a cup-shaped apical excavation, brownish yellow with a brown spot on inner side on which there are a number of short setæ; hairs of whorls rather long, sparse, black. Eyes purplish-black. Clypeus short, elliptical, prominent, blackish brown, nude. Occiput brown, clothed medianly with narrow, curved, sordid whitish scales, a large quadrate patch of flat, dull black ones at the sides, the cheeks and the margins of the eyes silvery white scaled; many erect forked black scales on the nape.

Prothoracic lobes elliptical, remote dorsally, dark brown, with a few pale scales and black bristles. Mesonotum dark brown, uniformly clothed with narrow, curved, dark bronzy brown scales, a short row of silvery ones on either side of the small antescutellar bare space. Scutellum trilobate, clothed with narrow, shining white scales medianly, a few small black ones laterally, each lobe with a group of black bristles. Postnotum elliptical, prominent, sordid ochraceous brown, nude. Pleuræ blackish brown, coxæ luteous, with patches of flat white scales and rows of short brown bristles.

Abdomen subcylindrical, flattened, the posterior segments tapered; dorsal vestiture dull black without luster, somewhat brownish in the centers of the segments, a series of white, triangular lateral patches at bases of segments, larger posteriorly and dorsally visible on segments 5, 6 and 7; first segment black scaled and with many pale setæ; venter yellowish white scaled, with narrow, apical, black segmental bands, faint in some specimens. Cerci black.

Wings rather broad, hyaline, faintly infuscated; petiole of second marginal cell about half as long as its cell, that of second posterior shorter than its cell; basal cross-vein about its own length distant from anterior cross-vein; vestiture dark brown, the outstanding scales narrowly ligulate. Halteres whitish, with black knobs.

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Legs rather long and slender; femora pale yellowish beneath, black above and at tip; tibiæ and tarsi black with a slight greenish luster; extreme tips of tibiæ yellowish on the inner side; base of first tarsal joint of hind legs yellowish on inner side. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4 mm.

Life history and habits unknown.

Tropical America.

Santo Domingo, West Indies, August, 1905 (A. Busck); Trinidad, June, 1905 (A. Busck); Rupununi, British Guiana (K. S. Wise); Bocas del Toro, Panama, September 28, 1903 (P. Osterhout); Bluefields, Nicaragua (W. F. Thornton). Reported also from Counani, French Guiana (Neveu-Lemaire).

AËDES SPENCERII (Theobald) Dyar.

Culex spencerii Theobald, Mon. Culic., ii, 99, 1901.
Culex spencerii Giles, Gnats or Mosq., 2 ed., 431, 1902.
Grabhamia spencerii Theobald, Mon. Culic., iii, 250, 1903.
Grabhamia spencerii Ludlow, Journ. N. Y. Ent. Soc., xi, 143, 1903.
Culex spenceri Dyar, Proc. Ent. Soc. Wash., vi, 41, 1904.
Grabhamia spencerii Theobald, Genera Ins., Dipt., fasc. 26, 23, 1905.
Culex spenceri Blanchard, Les Moustiques, 277, 1905.
Grabhamia spenceri Blanchard, Les Moustiques, 397, 1905.
Ochlerotatus spenceri Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 18, 1906.
Grabhamia spenceri Theobald, Mon. Culic., iv, 285, 1907.
Aëdes spenceri Dyar, Proc. U. S. Nat. Mus., xxxii, 125, 1907.
Aëdes spenceri Knab, Journ. N. Y. Ent. Soc., xv, 216, 1907.
Aëdes spenceri Knab, Smiths. Misc. Colls., quart. iss., i, 541, 1908.
Grabhamia spencerii Theobald, Mon. Culic., v, 290, 1910.

ORIGINAL DESCRIPTION OF CULEX SPENCERII:

Thorax black, with narrow golden curved scales in the middle, the sides with broader, creamy-coloured ones, and two short, parallel paler lines behind and more pale ones in front of the scutellum. Abdomen covered with creamy and white scales, with large, black-scaled patches on each side of the middle line. Legs brown, pale scales scattered about on the tibiae and metatarsi; femora mostly pale ochraceous, with a few black scales; ungues uniserrated.

♀. Head brown, with pale golden curved scales and yellowish upright forked ones; a pale border round the eyes, small, flat, creamy scales at the sides, and then flat dark ones; antennae black, basal joint with a large tuft of pale scales on the inside; second joint testaceous at the base; palpi densely black scaled, sometimes grey towards the tip.

Thorax black, covered with narrow, golden-brown scales in the middle, the sides with rather broader creamy-coloured scales and two short, parallel, paler lines of scales behind, running half across the mesothorax, and similar pale ones in front of the scutellum; dense golden bristles over the roots of the wings; scutellum dark brown, with pale, curved, creamy scales and golden bristles; metanotum deep brown; pleurae dark brown, with dense white scales.

Abdomen covered with black and creamy-white scales, the white predominating, the black scales forming more or less distinct lateral patches, indistinct on the last few apical segments; the posterior borders with very pale golden scales; venter white scaled.

Legs unbanded; coxae and femora pale ochraceous, almost white, a few black scales above and at the apex; knee spots small, white; tibiae covered with pale brown, ochraceous, and dull white scales, with black bristles, dark towards the apex; metatarsi and tarsi bronzy-brown, a few white scales towards the base of the former; fore and mid ungues black, with a sharp, short, blunt tooth near the base; hind ungues also with small teeth.

Wings with yellowish veins and black and white scales as follows: costa (except at the base), first, second, and fifth long veins dark scaled, also the apices of the fork of the second posterior cell, the others with pale creamy-yellow scales; first sub-marginal cell very short, a little longer and about half the width of the second posterior cell; its base nearer the apex of the wing than the base of the second posterior cell; its stem equal in length to the cell; stem of the second posterior longer than the cell; posterior cross-vein about its own length distant from the mid cross-vein. Halteres ochraceous with a slightly fuscous knob.

Length.—4 mm.

Habitat.—Manitoba, Canada (W. I. Spencer) (19. 1. 1900).

Time of capture.—July.

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Observations.—Four specimens of this species have been received. One shows considerable abdominal variation, the white scales being dotted irregularly over the surface; the abdominal ornamentation is, however, decidedly characteristic, as is also the thoracic, and should serve at once to separate it from the other Culices with unbanded legs. The distribution of the two coloured scales to the wing is also peculiar. Two of the specimens were from Stony Mountain, and the other two from St. Boniface. It has some resemblance to *C. dorsalis*, but is distinct, having unbanded legs, etc.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES SPENCERII:

Female.—Proboscis slender, rather long, subcylindrical, uniform, the labellæ rather broad; vestiture black; setæ minute, curved, black, those on the labellæ more prominently outstanding. Palpi short, less than one-fifth as long as the proboscis, black scaled, some pale ones intermixed, particularly at bases of joints; setæ moderate, black. Antennæ with the joints subequal, rugose, pilose, black, second joint slightly enlarged, with a small patch of white scales on inner side; tori subspherical, with a cup-shaped apical excavation, brownish black, clothed within with small white scales. Clypeus short, rounded, prominent, black, nude. Eyes bronzy-black. Occiput black, clothed with shining grayish white scales, narrow curved ones on the vertex, broader ones on the sides, many slender erect forked pale yellow scales on the nape; cheeks clothed with broad grayish white scales; bristles along margins of eyes black, those projecting between the eyes pale yellow.

Prothoracic lobes elliptical, remote dorsally, black, clothed with pale brown and whitish scales and pale bristles. Mesonotum black, clothed with narrow curved scales, dark bronzy brown in a broad median stripe and narrowly along the lateral margins, shining yellowish white scaled on sides of disk and about antescutellar space; a narrow dark-brown stripe each side of antescutellar space and extending over posterior third of the disk. Scutellum trilobate, black, clothed with narrow, curved, yellowish white scales, each lobe with a group of pale bristles. Postnotum short, elliptical, prominent, blackish, nude. Pleuræ and coxæ blackish, clothed with patches of elliptical, flat, white scales and rows of pale setæ; prothoracic epimera clothed with bronzy brown scales like those on mesonotum.

Abdomen subcylindrical, flattened, tapering posteriorly; dorsal vestiture of black and grayish-white scales, the whitish scales predominate, forming apical and basal segmental bands and medio-dorsal and lateral lines, the last two segments being almost wholly whitish scaled above; first segment with a patch of white scales and many pale setæ; venter almost wholly whitish scaled, a small black spot medianly at the base of each segment. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell a little longer than its cell, that of second posterior about the length of its cell; basal cross-vein less than its own length distant from anterior cross-vein; scales on the veins black and white, not evenly intermixed; costa and first vein white to about the middle and then black, subcosta nearly all white, third vein, forks of fourth, the fifth (except the extreme base) with its forks are black, the other veins white scaled, outstanding scales broadly linear, grey. Halteres with whitish stems and black knobs.

Legs moderately long and slender; femora with whitish scales beneath, black and white intermixed dorsally, the black ones heaviest at tip above; knees narrowly white; tibiæ pale grey scaled, with a few black ones intermixed; tarsi with the basal joint grayish-white scaled, the black scales predominating more outwardly, the other joints wholly bronzy-brown scaled above, silvery grey beneath and laterally. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4 mm.

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Male.—Proboscis moderately long, straight. Palpi about as long as the proboscis; apex of the long joint and the last two joints thickened, clothed with long, dense, dark brown hairs; vestiture of blackish scales with violet luster, some grey ones intermixed, patches of white scales towards apex of long joint and at bases of last two joints. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, black at insertions of the hair-whorls; hairs long, dense, dark brown. Coloration similar to the female, the vestiture sparse throughout. Wings narrower, the stems of the fork-cells longer, the vestiture sparse. Abdomen long, slender, depressed, without median dorsal stripe, the dark scales predominating and with purplish luster; sides with dense, long, pale ciliation. Claw formula, 2.1–2.1–1.1.

Length: Body 5.5 mm.; wing 4 mm.

Genitalia (plate 27, fig. 185): Side-pieces nearly three times as long as wide, tips conically rounded; apical lobe well removed from tip, rounded, prominent; basal lobe large, rounded, prominent, densely clothed with short setæ with tubercular bases, a large spine with accompanying hairs at base. Clasp-filament slightly enlarged mesially, with a long articulated terminal spine and two small setæ from notches before the tip. Harpes broad, flat, with revolute edges, tip thickened, pointed, point directed laterally; harpagones with a slender columnar stem, thickened at base, a jointed apical filament broadening out mesially on one side, the tip pointed. Unci invisible. Basal lobes small, rather approximated, each bearing four setæ at tip.

Larva, Stage IV (plate 123, fig. 426).—Head rounded, wider than long, widest through eyes; antennæ rather short, spinose, the small tuft rather before middle; both pairs of dorsal head-hairs single, ante-antennal tufts of four hairs. Tracheæ broad. Skin smooth. Lateral abdominal hairs single on segments three to six. Lateral comb of eighth segment of about nine large scales in an irregularly doubled row. Air-tube stout, less than three times as long as wide, tapering outwardly; pecten of about twelve long, sharp teeth, the last one or two detached, reaching to near middle of tube, followed by a small hair-tuft. Anal segment longer than wide, with a large dorsal plate, reaching well down toward the ventral line; dorsal hairs a long hair and a tuft on each side; lateral hair small, single; ventral brush well developed, with shorter tufts preceding the barred area. Anal gills large, longer than the segment, tapering to a point, equal.

The larvæ develop in the early spring in the temporary pools of snow-water upon the western prairies. There is but a single generation in the year and the eggs overwinter on the ground. Mr. Knab made especial observations upon this species. He says:

"This is the common mosquito of the prairies of Saskatchewan, and apparently occupies the entire northerly portion of the prairie region of North America. It is very bloodthirsty, and its excessive abundance makes life upon the prairie a torture during the early summer. The first larvæ of this species were found, newly hatched, at Oxbow, on May 6, in ditches along the railroad. The weather continued cold for some time after this and the pools froze over at night. This apparently did not injure the young larvæ. On May 16 a large number of pools were examined, and it was found that all but the larger pools contained larvæ. The pool from which the young larvæ were obtained on May 6 now contained many larvæ. It was deep and large and the water cool; in consequence the larvæ were still in the second stage. In smaller, shallow pools, where the water was warm, the larvæ were much further advanced. A shallow puddle in the field close by the railroad station, the water of which was remarkably warm, contained numerous larvæ, mostly in the third stage. The larvæ for the most part kept among the grass close to the margin, where the water was warmest and they were best protected from the wind. These larvæ, brought

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into the house, nearly all molted on the following day. A day later (May 18) a number of the larvæ pupated. In the meantime there had been severe frosts during the nights and the pools were repeatedly frozen over and thawed out again by the sun of the following day. But in spite of this the larvæ developed as rapidly out of doors as in the house, the effect of the sun more than offsetting the retarding influence of the cold nights. The first adults were bred out on May 22. Larvæ continued to increase in numbers during the following week, those in the small warm pools being most abundant and developing most rapidly. The small permanent ponds contained no larvæ. By the end of the month the larvæ of this species had practically all disappeared.

"Adults of this species first appeared active on May 30 and a few came to bite. They were first noted in numbers on June 5, a warm, sunny day following four days of cold, cloudy weather. They came drifting before the wind, and during calm intervals were very annoying. * * * * This day proved the maximum of activity for this species of mosquito. No more swarming of males or matings were observed. On June 10 there was a very high wind, which kept the mosquitoes close to cover. Only a few came to bite, but these were very bloodthirsty. They would rise out of the grass to leeward and fly against the wind, alighting with a perceptible momentum.

"June 11 was a hot day, with only light wind. The female mosquitoes appeared less numerous than two days previously. The males were abundant on willow blooms, busily probing for honey.* None were seen swarming.

"June 12 was warm but windy, yet the males were still found upon the willow catkins, although they could maintain their hold only with difficulty. High winds continued for five days and nothing was seen of the mosquitoes. On June 18 the males had nearly all disappeared; there were none on the willow catkins and only a very few could be found by beating grass and bushes. The females were still in evidence.

"This species is strictly diurnal and is only active in full daylight. It hides in the grass of the prairie until disturbed or attracted by some passing animal. It appears that the habit of this prairie mosquito, of flying toward prominent objects, under normal conditions brings it to its source of food, some large warm-blooded animal. The blood-sucking habit is doubtless normal in this species, and other foods, such as the honey of flowers, are to be looked upon as supplementary when blood is not available. The idea that but few mosquitoes can obtain a meal of blood is entirely erroneous—at least with reference to this species. In former times the prairie teemed with warm-blooded animals, of which the great herds of bison, the antelopes, and deer need only be mentioned. At the present day man, horses, and cattle furnish an abundant supply of blood. On the other hand, in the male this same habit of gathering around prominent objects leads them to the same places to which the females are attracted for food, and thus the union of the sexes is brought about."

Mr. Knab's observations on the mating habits are quoted in the first volume of this work, on page 130.

Prairies of Canada and northern United States, from Manitoba westward to British Columbia.

Winnipeg, Manitoba, June 22, 1907 (F. Knab); Aweme, Manitoba, July 3 (J. Fletcher), May 17, 1904, June 10, 1904 (N. Criddle); Oxbow, Saskatchewan, May 30, 1907 (F. Knab); Belonge Creek, Saskatchewan, July, 1907 (V. A. Armstrong); Kinisteno, Saskatchewan, July 10 (J. Fletcher); Regina, Saskatchewan, June 9, 1907 (T. N. Willing); Strassburg, Saskatchewan, June 3, 1907 (T. N. Willing); Carnduff, Saskatchewan, May 28, 1901 (J. Fletcher);

* Knab, Frederick: Mosquitoes as flower visitors. Journ. N. Y. Entom. Soc. vol. xv, 1907, p. 215.

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Alameda, Saskatchewan, June 5, 1902 (J. Fletcher); Olds, Saskatchewan, July 5, 1901 (J. Fletcher); Rosthern, Saskatchewan, July 13 (J. Fletcher); Kaslo, British Columbia, June 13, 1903 (R. P. Currie) and June 24, 1903 (H. G. Dyar); Fargo, North Dakota, July 2, 1915 (W. B. Bell); Judith Basin, Montana, June 8, 1914 (J. R. Parker); Cascade, Montana, June 4, 1914 (J. R. Parker). Reported also from California (C. S. Ludlow).

The record of *Aëdes spencerii* from California is open to doubt. We have not seen the specimens, but think that, if of this group at all, they more probably represent *Aëdes idahoensis* than *spencerii*.

This species shows great variation in the coloration of the imago. The lighter scales on the mesonotum vary in color from silvery white to ochreous yellow and also in extent. The abdominal markings of the female are excessively variable. The median dorsal stripe may be obsolete, each segment being black scaled with grey margins. In many specimens the grey scales predominate, sometimes leaving only a few scattered black scales on some of the segments. In still other specimens the dorsum of the abdomen is entirely grey scaled.

Culex punctatus Meigen (Klass. u. Beschr. europ. zweifl. Ins., i, 6, 1804) of Europe is similarly marked and undoubtedly closely related to *Aëdes spencerii*. It may even prove to be identical, but the species has not been studied by modern workers. Theobald indicates Meigen's species as a synonym of *Culex rusticus* Rossi (Fauna Etrusca, ii, 333, 1790) and refers *Culex quadratimaculatus* Macquart (Hist. Nat. Ins., Dipt., i, 34, 1834) to the same species, but he has seen no specimens; the latter is a change of name for *Culex pungens*, under which name it has been described by Robineau-Desvoidy (Mém. Soc. Hist. Nat. Paris, iii, 407, 1827).

AËDES IDAHOENSIS (Theobald) Dyar & Knab.

Grabhamia spencerii var. *idahoensis* Theobald, Mon. Culic., iii, 250, 1903.
Ochlerotatus spencerii Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.
Aëdes idahoensis Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 57, 1908.

ORIGINAL DESCRIPTION OF GRABHAMIA SPENCERII, VARIETY IDAHOENSIS:

Abdominal basal bands almost white, broad apical bands yellowish-white to white, very narrow, almost obliterated on some segments; the abdomen not pale at the sides, so that only broad basal and narrow apical pale areas are shown, the two apical segments are mostly pale scaled, and there are scattered pale scales on the others. The pale thoracic scales are also of a more frosty hue than in the type.

Professor Aldrich sends the following note regarding this species: "It is so small that it readily crawls through ordinary mosquito screen. At the hotel in Market Lake it was found necessary to apply a thick coat of paint to the screens after they were in place; this reduced the size of the holes enough so that no further trouble was experienced in their coming through. It is a very annoying species, and seems to breed altogether in an arm of the Snake River which lies beside the little town, and which has no current except during the period of high water in the spring. Two miles from the town, where the only breeding-place is the seepage from irrigating ditches, there is a different species of mosquito."

DESCRIPTION OF FEMALE AND MALE OF AËDES IDAHOENSIS (LARVA UNKNOWN):

Female.—Proboscis moderately long and slender, subcylindrical, the labellæ conically tapered; vestiture brownish black; setæ minute, those on the labellæ more prominently outstanding. Palpi short, less than one-fourth the length of the proboscis, black, the setæ moderate. Antennæ with the joints subequal, black, rugose, pilose; second joint somewhat enlarged and clothed with white scales on inner side; tori subspherical, with a cup-shaped apical excavation, blackish, largely clothed with small white scales on inner side. Clypeus roundedly triangular, prominent, black, nude. Eyes black. Occiput black, clothed with narrow curved scales on the vertex, flat ones on the sides, all yellowish-white, many pale, short, erect forked scales on the nape; bristles along margins of eyes black, those projecting between the eyes pale.

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Prothoracic lobes elliptical, remote dorsally, black, clothed with whitish scales and pale tipped setæ. Mesonotum black, clothed with narrow curved scales, dark bronzy or pale brown in a moderately broad median stripe, grayish-white laterally, about the antescutellar space and on the anterior margin; a narrow dark-brown stripe each side of antescutellar space, extending over posterior third of disk; a few brown scales on humeral margins. Scutellum trilobate, black, clothed with whitish scales, each lobe with a group of pale setæ. Postnotum elliptical, prominent, black, nude. Pleuræ black, coxæ brown, clothed with patches of elliptical, flat white scales and rows of pale setæ; epimera clothed with whitish, narrow curved scales like those on mesonotum.

Abdomen subcylindrical, flattened, tapering posteriorly; dorsal vestiture of black and white scales, the white ones forming broad basal and very narrow apical segmental bands with a few scattered scales along the median line, sometimes forming a medio-dorsal stripe, the white basal bands widened on the sides but not continuous, interrupted apically by the black ground-color; in some specimens both the median pale scales and the apical bands are absent; venter white scaled. Cerci black.

Wings rather broad, hyaline; petiole of second marginal and second posterior cells about as long as their cells; basal cross-vein about its own length distant from anterior cross-vein; scales of the veins black and white, costa largely black scaled, shortly white at base; subcostal vein with the white scales predominating, third vein, forks of fourth and fifth vein with its forks black scaled, second and fourth veins mostly white scaled, sixth vein white with a few black scales. Halteres brownish, with black knobs.

Legs moderate; femora with whitish scales below, except at extreme tip, above black mottled with whitish; knees narrowly whitish; tibiæ grey scaled with a few black ones intermixed, principally on upper and lower sides; tips black; tarsi with the basal joint grey scaled, the black scales predominating more outwardly, the remaining joints wholly black dorsally, grey beneath and at sides. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis rather long and slender, the vestiture black. Palpi exceeding the proboscis by the length of half of the last joint; last two joints and tip of long joint enlarged and bearing dense long brown hairs. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, brown, unicolorous; hairs of whorls long, dense, dark brown. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture sparse. Abdomen elongate, depressed, with pale lateral ciliation. Claw formula, 2.1–2.1–1.1.

Length: Body 5.5 mm.; wing 4 mm.

Genitalia (plate 27, fig. 186): Side-pieces over twice as long as wide, tips rounded; apical lobe developed, rounded; basal lobe rounded, somewhat prominent, covered with tubercles bearing short setæ, a large stout spine on lower side accompanied by a group of setæ. Clasp-filament long, somewhat swollen mesially, with three setæ without near the tip and a long articulated terminal spine. Harpes elliptical, inner margin thickened and revolute, bent and pointed at tip. Harpagones with moderate, thick, columnar stem and terminal filament, which is expanded beyond the base and slightly irregularly notched. Basal appendages small, with several short setæ.

Life history and habits unknown.

Nevada, Idaho, and Montana.

Market Lake, Idaho (J. M. Aldrich); Pocatello, Idaho, June 24, 1904 (E. S. G. Titus); Dillon, Montana, August 5, 1908 (R. A. Cooley); Elburz, Nevada, June 25, 1903 (H. S. Barber).

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Aëdes idahoensis is closely allied to *Aëdes spencerii*, but is, we think, distinct. On the abdomen the median dorsal stripe is either absent or ill-defined and the lateral margins are not continuously pale scaled, as in that species. It occupies a different geographical area; *spencerii* extends throughout the Canadian prairies, while *idahoensis* replaces it to the south. It is probable that the record of *spencerii* from California refers rather to this species, but we have not seen the specimens. Professor Aldrich's remarks about the habits, quoted by Theobald, refer to *Aëdes aldrichi* and not to this species. The habits of *idahoensis* are unknown, although they are probably essentially similar to those of *spencerii*.

AËDES FUSCUS Osten Sacken.

Aëdes fuscus Osten Sacken, Bull. U. S. Geol. Surv., iii, 191, 1877.
Aëdes fuscus Giles, Gnats or Mosq., 348, 1900.
Aëdes fuscus Theobald, Mon. Culic., ii, 226, 1901.
Aëdes fuscus Giles, Gnats or Mosq., 2 ed., 481, 1902.
Aëdes fuscus Dyar, Journ. N. Y. Ent. Soc., x, 197, 1902.
Aëdes fuscus Johannsen, Bull. 68, N. Y. State Mus., 425, 1903.
Aëdes fuscus Dyar, Proc. Ent. Soc. Wash., v, 145, pl. ii, f. 11, 1903.
Aëdes fuscus Theobald, Mon. Culic., iii, 286, 1903.
Aëdes fuscus Dyar, Proc. Ent. Soc. Wash., vi, 41, 1904.
Aëdes fuscus Felt, Bull. 79, N. Y. State Mus., 339, 391*e*, 1904.
Aëdes fuscus Smith, N. J. Agr. Exp. Stat., Rept. Mosq., 332, 1905.
Aëdes fuscus Blanchard, Les Moustiques, 402, 1905.
Aëdes fuscus Theobald, Gen. Ins., Dipt., 26 fasc., 35, 1905.
Culex pallidohirta Grossbeck, Can. Ent., xxxvii, 359, 1905.
Aëdes fuscus Felt, Bull. 97, N. Y. State Mus., 447, 492, 1905.
Aëdes fuscus Britton & Viereck, Rept. Conn. Agr. Exp. Stat., 1904, 271, 1905.
Aëdes fuscus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 194, 1906.
Aëdes fuscus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 18, 1906.
Aëdes fuscus Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 4, 1906.
Aëdes fuscus Theobald, Mon. Culic., iv, 538, 1907.
Aëdes fuscus Knab, Smiths. Misc. Colls., quart. iss., i, 546, 1908.
Aëdes fuscus Thibault, Proc. Ent. Soc. Wash., xii, 16, 1910.
Aëdes fuscus Dyar & Knab, Proc. Ent. Soc. Wash., xii, 81, 1910.
Aëdes fuscus and *Aëdes pallidohirta* Morse, Ann. Rept. N. J. State Mus., 1909, 720, 1910.
Aëdes fuscus Theobald, Mon. Culic., v, 484, 1910.
Culex pallidocephala Theobald, Mon. Culic., v, 612, 1910.
Culex pallidohirta Theobald, Mon. Culic., v, 612, 1910.

ORIGINAL DESCRIPTION OF AËDES FUSCUS:

♂ ♀.—Brown; thorax clothed with a short, appressed, brownish-golden tomentum; abdomen with whitish-yellow narrow bands at the base of the segments; venter whitish-yellow. Antennae black; proboscis and legs brownish, with a metallic reflection; femora paler on the under side; pleurae under the root of the wings with a spot clothed with whitish scales. Long. corp. 3–4 mm.

Hab.—Cambridge, Mass., in May.

Obs.—I bred this species from larvæ which I found in a pool together with those of several species of *Culex*. The larvæ and pupae behaved exactly like those of *Culex*, and only attracted my attention by their smaller size. If I could have known beforehand that they belonged to *Aëdes*, I would have compared them more closely with the larvae of *Culex*. The metamorphosis of *Aëdes* has never been observed before.

ORIGINAL DESCRIPTION OF CULEX PALLIDOHIRTA:

♀.—Head brown, occiput clothed with yellowish scales and a few dark brown ones intermixed; antennæ brown, the basal joint and basal half of following one dirty yellow; proboscis brown, with whitish scales scattered over the surface save at the apical fourth; palpi brown, tipped with silvery white, four jointed, apical joint minute, flattened, spiny. Mesonotum covered with pale brown scales and with a narrow median furrow obsolete on posterior portion, bounded on each side by scales of a slightly darker colour; a lateral line of pale yellow scales beginning near the posterior margin and extending to the middle of the lateral margin of the mesonotum also encloses these darker scales; scutellum pale brown with creamy-yellow bristles on the posterior margin; metanotum evenly pale brown; pleura yellowish-brown with patches of whitish scales; halteres dirty white. Abdomen creamy with a metallic silvery-gray lustre in life, somewhat darker with grayish shadings in

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pinned specimens; genitalia dark brown. Legs cream coloured, the anterior part of all femora and also anterior part of tibia of fore leg brownish; the apical two or three joints of fore and mid tarsi also brownish; claws all uniserrated; wings hyaline with slender brown scales and broad whitish ones, petiole of first submarginal cell about half the length of this cell. Length 4.5–5 mm.

Types, 2 females in the New Jersey Experiment Station collection. This species is at once recognizable by its silvery lustre and cream-coloured legs.

A single specimen of this species hatched May 5th out of a lot of larvæ and pupæ sent in by Mr. Brehme, who collected them as *Culex Canadensis* from the Orange Mountains. The remaining larvæ were immediately put into alcohol and the pupæ left to develop; but all *Canadensis* emerged from the pupæ and no larvæ distinguishable from that species could be found. Another collection in the same locality was made several days after the first and from this lot another female hatched May 26th. Of the numerous other larvæ with which they were associated all were *Canadensis* and one *Corethra cinctipes*. We had evidently gotten hold of the tail end of the brood; no larvæ remaining.

ORIGINAL DESCRIPTION OF CULEX PALLIDOCEPHALA:

A light coloured medium sized species, with creamy coloured unbanded legs, brownish unbanded beak and silvery-grey unbanded abdomen. Wings unspotted. Thorax pale brown, marked with darker scales on the sides of a narrow median groove, and enclosed in a semicircular lateral line on the posterior half.

United States.

I have the above description, but cannot trace the reference.—F. V. T.

DESCRIPTION OF FEMALE, MALE, LARVA, AND PUPA OF AËDES FUSCUS:

Female.—Proboscis rather stout, subcylindrical, uniform, the labellæ conically tapered; vestiture bronzy-brown; setæ on the labellæ minute, outstanding. Palpi short, about one-sixth as long as the proboscis, black; setæ moderate, bristly. Antennæ with the joints subequal, rugose, pilose, black, second joint slightly thickened and paler; tori subspherical, with a cup-shaped apical excavation, luteous, darker and with a patch of small black scales on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, prominent, black, nude. Eyes black. Occiput pale golden brown scaled on the vertex, the scales partly narrow, a large area of flat black scales on each side, cheeks clothed with broad shining yellowish scales, many erect, short, pale forked scales on the nape; bristles along margins of eyes black, those projecting between the eyes pale.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with narrow yellowish scales and dark bristles. Mesonotum reddish brown, clothed with narrow curved scales, uniformly golden brown, paler about antescutellar space and over roots of wings. Scutellum trilobate, dark gray, clothed with narrow curved, pale yellow scales, each lobe with a group of brown bristles. Postnotum elliptical, prominent, yellowish brown, shining, nude. Pleuræ pale brown, coxæ luteous, clothed with patches of elliptical, flat white scales and rows of pale bristles; epimera of prothorax clothed with golden brown scales like those on mesonotum.

Abdomen subcylindrical tapering posteriorly; dorsal vestiture black with slight bronzy-brown luster, the segments with narrow whitish basal bands which widen at the sides and join a continuous yellowish white lateral stripe; first segment with a large patch of black scales in the middle, some light ones at base and sides, and with numerous fine, pale hairs; venter entirely yellowish-white scaled. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell a little longer than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales brown, the outstanding ones broadly linear. Halteres whitish, with dark knobs.

Legs moderately long and slender; femora clothed with yellowish-white scales at base and below, with bronzy-brown ones above; tibiæ bronzy-brown scaled above, paler below; tarsi uniformly bronzy-brown scaled. Claw formula, 1.1–1.1–1.1.

Length: Body about 4 mm.; wing 3.5 mm.

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Male.—Proboscis rather stout, slightly enlarged towards apex, nearly straight. Palpi one-seventh the length of the proboscis, uniform, slender; vestiture black. Antennæ plumose, the last two joints long and slender, pilose, black, the others shorter, white, blackish at insertions of hair-whorls; hairs of whorls long, dense, brown. Coloration similar to the female. Wings narrower than in the female, stems of the fork-cells longer, vestiture less abundant. Abdomen elongate, slender, somewhat depressed and broadened towards apex; basal segmental bands broader and whiter than in the female, the last segment entirely white scaled; lateral ciliation coarse, irregular, pale. Claw formula, 1.0–1.0–1.1.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 34, fig. 226): Side-pieces about twice as long as broad, tapering to a small rounded tip, no apical lobe, two basal lobes, the dorsal one consisting of two slender processes joined at base and bearing one and three hairs respectively, the inner one consisting of a rounded conical process, densely setose. Clasp-filament subapically situated, double, the apical arm slender, curved, widely furcate at tip, with a small articulated spine on one of the forks, the basal arm about half as long as the other, rounded, with a group of setæ at the tip. Harpes small, elliptical, inner margin revolute, tip bluntly rounded, without point. Harpagones absent. Unci slender, approximate, incurved, tips furcate. Basal appendages long, capitate, remote at their origins, tips approximated to lower basal lobe of side-piece, densely setose.

Larva, Stage IV (see figure of the entire larva, plate 70).—Head broad, rounded, narrowed before eyes, notched at insertion of antennæ, front margin broadly arcuate. Antennæ rather long, subcylindrical, slightly tapered beyond middle, uniformly covered with rather coarse spines, a moderately long hair tuft at middle; a rather long terminal spine, three subequal shorter ones, and a small digit on a pedicel. Eyes large, transverse, pointed. Both pairs of dorsal tufts and ante-antennal tufts multiple and long. Mental plate long, triangular, terminal tooth moderately stout, with twelve lateral teeth on each side, basal ones becoming more remote, with rounded intermedial incisions. Mandible quadrangular, convex without, outer marginal portion long; one pair of appendages before tip; an outer row of cilia arising from a strong collared prominence; nine filaments on front margin arising from angular incised bases; dentition of four subequal teeth on a constricted prominence, two filamentous teeth before, several short irregular ones at base, two broad filaments within, the lower serrate; interior lobe with a finger-shaped furcation and patches of fine hair; inner angle sharp, produced, five hairs within; a row of long hairs at base. Maxilla elliptical, divided by a narrow suture; inner half with a prominent angle above the middle, from which arises a small brush of hairs; a row of hairs at apex; inner surface covered with short hairs which form a small patch on outer half about the two filaments near the suture; palpus small, strongly constricted centrally, with three rather large and two minute terminal digits. Mouth-brushes moderate, normal. Thorax rounded, transverse, wider than long; hairs moderate, rather short, the subdorsal mesothoracic ones short and single. Abdomen elongate, anterior segments short, transverse, posterior ones more elongated, seventh segment elongate quadrangular; lateral hairs of third to sixth segments single, secondary hairs minute. Tracheal tubes broad, band-shaped, roundedly expanded outwardly in the segments. Air-tube stout, rather long, tapered outwardly, about three and a half times as long as wide; pecten reaching beyond middle of tube, the three distal teeth detached, remote, followed by a small hair-tuft at outer third. Lateral comb of eighth segment of few scales in a partly double row; single scale elliptical, with a long apical process as long as body of scale, fringed with short hairs before the process. Anal segment longer than wide, the dorsal plate large, reaching near the ventral line; dorsal hairs a long hair and brush on each side; a minute tuft near posterior angle of plate; ventral

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brush well developed, with small tufts preceding the barred area nearly to the base. Anal gills long, ensiform, tapered to a sharp point.

Pupa (plate 149, fig. 763).—Thoracic mass pyriform, stout; small hair-tufts on the dorsum anteriorly and posteriorly; air-tubes small, slender, but slightly expanded. Abdomen stout, rather long, with numerous small hairs and tufts on the segments, the posterior lateral hairs single. Anal paddles large, elongate, broadly rounded posteriorly, with a single terminal seta.

The species hibernates in the egg state and the larvæ occur in temporary ground-puddles, appearing in the spring and at intervals during the summer, whenever the puddles are filled by rains. The females bite readily by day. There is apparently a tendency for most of the eggs to hatch early, especially in the southern parts of the range of the species. Professor Smith, who has observed the species in New Jersey, says:

"There is every reason to believe that this species winters in the egg stage; first, because it has been found very early in the larval stage, in company with species of which it is known that they winter in that way and, second, because the larva has been found in pools dry during the winter and only filled by the spring rains. The earliest dates are from Mr. Brakeley, who collected a miscellaneous lot of larvæ April 7th, from which adults of this species were obtained April 13th. It may be in place here to say that these larvæ are so much like others that are found in the same pools early in spring that unless attention is especially directed to them they readily escape recognition. The next date, April 18th, is also from Lahaway, where the larvæ were taken in company with those *C. aurifer*. The first pupa formed April 19th, giving adult on the 24th; the second formed on the 20th, giving adult on the 25th; a five day period in each case. The fact that this species is not a larval hibernate was definitely settled when, on April 15th, nearly mature larvæ were found by Mr. Brakeley in a pool that had been completely dry during the winter.

"April 24th, Mr. Grossbeck found pupæ from which this species emerged, at Mountain View, and May 2nd, Mr. Brehme found the same stage at Arlington. Larvæ, pupæ and adults were found at Metuchen, May 7th, by Mr. Grossbeck, who took quite a number of the early stages during the two or three succeeding days as well. May 10th, pupæ were taken in the Great Peace Meadows from which adults emerged on the 11th and at the same place other pupæ were taken on the 21st, yielding adults on the 22nd. May 26th, larvæ and pupæ were taken by Mr. Dickerson in the Black River Swamp in Morris County and a single example of this species was identified among a lot of *canadensis*.

"There are no records of later captures in any stage and it is fair to conclude that there are no late broods.

"Mr. Brakeley classes this among the local breeders; that is, a species which he can count upon finding every year in about the same places; but which does not occur in all bodies of water even under similar conditions."

Dr. Dyar reared *Aëdes fuscus* throughout the summer from rain-puddles in New Hampshire, in company with *Aëdes canadensis* and *Aëdes sylvestris*.

Canada and northern United States from the Atlantic to British Columbia, less abundant southward to Arkansas.

Center Harbor, New Hampshire, August 5, 1902 (H. G. Dyar); Springfield, Massachusetts, May 10, 1903 (F. Knab); Westfield, Massachusetts, July 14, 30, 1903 (F. Knab); Longmeadow, Massachusetts, larvæ May 7, 1905 (F. Knab); Hartford, Connecticut, April 12, 1905 (F. Knab); Scott, Lonoke County, Arkansas, April 14, May 20, 28, 1909 (J. K. Thibault, jr.); Tupper Lake, New York, August 11 (H. G. Dyar); Plattsburg, New York, larvæ April 20, 1905 (H. G. Dyar); Ithaca, New York, May 28, 1901 (O. A. Johannsen); Delair, New Jersey, June 21 (through J. B. Smith); Madison, Wisconsin (S. J.

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Holmes); Saxeville, Wisconsin, May, 1910 (B. K. Miller); Winnipeg, Manitoba, June 22, 1907 (F. Knab); east coast of Lake Winnipeg, Manitoba; Oxbow, Saskatchewan, June 17, 1907 (F. Knab); Kaslo, British Columbia, June 11, 1903 (H. G. Dyar).

Aëdes fuscus is closely related to, if not identical with, the European *Aëdes cinereus* Meigen (Syst. Beschr. d. bek. europ. zweifl. Ins., i, 13, 1818). We have had no opportunity to compare specimens, but the male genitalia of the European form, as figured by Eysell (Abh. u. Ber. Ver. Naturk. Kassel, xlviii, 295, fig. 6, 1903), show the same peculiar structure as our species and we have been unable to detect any differences. Recently De Meijere has described and figured the larva and pupa of the European species (Tijdschr. v. Ent., liv, 148-149, pl. x, figs. 25-28, 1911) and we find that these agree in every detail with our species.*

The description of *Culex pallidohirta* is founded upon two abnormally colored female specimens of *Aëdes fuscus*. In spite of the peculiar metallic luster of the vestiture, the lateral abdominal stripes, so characteristic of *fuscus*, can be distinguished. Dyar and Knab surmise that these peculiarly colored specimens were produced by the action of cold upon the newly formed pupæ and they have shown that similar aberrations occur with other species (Proc. Ent. Soc. Wash., xii, 81-82, 1910).

AËDES LAZARENSIS (Felt & Young) Dyar & Knab.

Culex lazarensis Felt & Young, Science, n. s., xx, 312, 1904.
Culex lazarensis Felt, Bull. 79, N. Y. State Mus., 309, 1904.
Culicada lazarensis Felt, Bull. 79, N. Y. State Mus., 391*b*, 1904.
Culicada lazarensis Felt, Bull. 97, N. Y. State Mus., 448, 478, 1905.
Grabhamia lazarensis Dyar, Proc. Ent. Soc. Wash., vii, 48, 1905.
Aëdes lazarensis Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 202, 1906.
Ochlerotatus lazarensis Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 19, 1906.
Ochlerotatus lazarensis Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 6, 1906.
Culicada lazarensis Theobald, Mon. Culic., iv, 360, 1907.
Culicada lazarensis Theobald, Mon. Culic., v, 295, 306, 1910.

ORIGINAL DESCRIPTION OF CULEX LAZARENSIS:

A larva somewhat resembling that of *C. impiger* was met with in a cold mountain pool at Elizabethtown, N. Y., June 9, adults emerging on the tenth and closely resembling those of *C. impiger*. The larva may be easily recognized by the conspicuous, triangular comb composed of about sixty rather large scales, each tipped with from four to seven stout, equal spines. The air tube is short, a little over twice as long as broad, slightly swollen at the basal third and bearing a double row of posterior pecten, each consisting of about twenty short, black, stout spines. The adult, *Culex lazarensis* n. sp., may be distinguished from *C. impiger* by its large size, it being 6 to 7 mm. long, and the vittate thorax with two dark lines. The wing of the female *C. lazarensis* is longer, the second longitudinal vein, particularly at its fork, is straighter, and the second fork cell is shorter and broader than in *C. impiger*. There are also marked differences in the male genitalia.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES LAZARENSIS:

Female.—Proboscis long, slender, subcylindrical, uniform, labellæ conically tapered; vestiture black; setæ minute, curved, black, those on the labellæ more prominently outstanding. Palpi short, about one-fifth as long as the proboscis; vestiture black; setæ moderate, bristly, black. Antennæ with the joints subequal, rugose, black, pilose, second joint somewhat enlarged, brown at base; tori subspherical, with a cup-shaped apical excavation, luteous, with a patch of small white scales on inner side; hairs of whorls moderate, sparse, black. Clypeus roundedly triangular, prominent, nude, black. Eyes black. Occiput black, clothed with narrow curved pale brownish-yellow scales on the vertex, broad

* At our suggestion Mr. F. W. Edwards of the British Museum has compared material from America and Europe and finds that there is no difference. Consequently *Aëdes fuscus* should be placed as a synonym of *Aëdes cinereus* Meigen. The information, unfortunately, comes too late to make the necessary changes in the text.

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flat yellowish-white ones at the sides, many short, erect, forked yellowish scales on the nape; setæ along margins of eyes black, those projecting forward at the vertex pale.

Prothoracic lobes elliptical, remote dorsally, black, clothed with broad, curved, whitish-yellow scales and black bristles. Mesonotum black, clothed with narrow, curved, light brownish-yellow scales and medianly with two narrow, approximated, longitudinal stripes, the scales on these smaller and dark brown, in the middle pale stripe a bare line, a short brown stripe on either side of antescutellar space, scales surrounding antescutellar space lighter; bristles numerous, moderate, black. Scutellum trilobate, black, clothed with pale yellow scales, each lobe with a group of brown bristles. Postnotum elliptical, prominent, black, slightly pruinose. Pleuræ brown, coxæ luteous, clothed with elliptical, flat, yellowish white scales and rows of pale bristles; prothoracic epimera clothed with pale brownish-yellow scales, similar to those on mesonotum.

Abdomen subcylindrical, flattened, tapering posteriorly; dorsal vestiture of brownish-black scales, each segment with a broad basal yellowish-white band which widens laterally and beyond the third segment reaches to the posterior angle; first segment with white scales and many pale setæ; venter largely yellowish-white scaled, with a row of small lateral apical black patches. Cerci black.

Wings rather narrow, hyaline; petiole of second marginal cell a little shorter than its cell, that of second posterior cell a little longer than its cell; basal cross-vein about its own length distant from anterior cross-vein; scales brownish-black, outstanding scales broadly linear, brownish-black. Halteres whitish.

Legs rather long and slender; femora black scaled above, yellowish-white below, except towards tips, the extreme tips white scaled; tibiæ black scaled, numerous pale scales on under side forming an ill-defined stripe; tarsi black scaled, the first joint with some pale scales beneath, the black scales increasing outwardly, the terminal joints wholly black. Claw formula, 1.1–1.1–1.1.

Length: Body about 5.5 mm.; wing 5 mm.

Male.—Proboscis rather long and slender, straight. Palpi exceeding the proboscis by about the length of the last joint; end of long joint and last two joints slightly enlarged and with long, dense, black hairs; vestiture wholly black. Antennæ plumose, the last two joints long, slender, rugose, pilose, black, the others short, pale, blackish at thickened insertions of hair-whorls; hairs of whorls long, dense, brownish-black with yellow luster. Coloration similar to the female. Wings narrower than in the female, the stalks of the fork-cells longer, the vestiture sparse. Abdomen long, slender, depressed, the basal segmental white bands much broader than in the female; lateral ciliation long, dense, pale. Claw formula, 1.1–1.1–1.1.

Length: Body about 6.5 mm.; wing 5 mm.

Genitalia (plate 26, fig. 181): Side-pieces three times as long as wide; apical lobe small, roundedly prominent; basal lobe hemispherical, densely setose, a stout spine on the inner side. Clasp-filament long, swollen in middle, with a row of fine subterminal setæ and long, articulated terminal spine. Harpes elliptical concave, inner margin revolute, tip curved, widely notched. Harpagones with a long columnar stem which is slightly bent at basal third and bears a little short pile; terminal filament narrowed at its base, tapering to tip, widest at basal sixth. Unci approximate, revolute, forming a small basal cylinder. Basal appendages approximate, rounded, bearing several short, stout spines.

Larva, Stage IV (plate 118, fig. 407).—Head rounded, narrowed before eyes, a slight notch at insertion of antennæ, front margin broadly arcuate. Antennæ moderate, slender, a little larger at base, slightly spined, especially toward base; a rather large tuft before middle; one longer and three short terminal spines and a terminal digit. Both pairs of dorsal head-hairs single, ante-anten-

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nal tufts multiple. Mental plate triangular, with a central tooth and thirteen on each side, the basal ones stouter and slightly more remotely spaced. Mandible quadrangular, with short spines at base; two filaments before tip; an outer row of long cilia; eleven filaments on outer edge; dentition of four teeth on a process, the first longest; a sharp spine and a blunt tooth before, a broad serrate filament and five slender ones within; process below furcate, stout, a row of hairs outwardly; basal angle prominent; a row of stout hairs within, a row of longer ones at base. Maxilla irregularly hemispherical, divided by a suture; inner half with a row of stout erect spines, two rows of cilia and some spines near the suture, a row of long hairs at tip; outer half with two filaments rather remote from the suture, situated beyond the middle, a spine on the other side; palpus stout, short, wide in proportion to maxilla, with four minute apical digits. Thorax rounded, wider than long; hairs abundant, moderate. Abdomen moderate, anterior segment shorter; lateral hairs double to fifth segment, single on sixth. Tracheal tubes rather broad, band-shaped. Air-tube stout, slightly tapered, over three times as long as wide; pecten reaching nearly to middle, the teeth evenly spaced, followed by a multiple hair-tuft; single tooth a long spine with wide base, a stout basal branch, and two or three small teeth. Lateral comb of eighth segment of many scales in a triangular patch; single scale bluntly rounded with pointed base, fringed with spinules, the apical ones of nearly equal length. Anal segment slightly longer than wide; dorsal plate reaching two-thirds of the way down the sides, straight on lateral margin; dorsal hairs a brush and hair on either side; a single lateral hair; ventral brush well developed, with short tufts preceding barred area toward base. Anal gills moderate, ensiform, as long as the segment or longer.

The larvæ occur in the early spring in temporary pools in company with the other species with similar habits. The eggs no doubt hibernate on the ground. The females form part of the swarm of mosquitoes frequenting the forests during the first half of the summer, and, like the other species, live for two months or longer and disappear by August. These specimens, when flown, can not longer be distinguished specifically from other species with black legs, such as *Aëdes abserratus, impiger, trichurus,* and *provocans.*

Canada and northeastern United States.

Elizabethtown, New York, June 11, 1904 (E. P. Felt); Karner, New York, May 13, 1904 (E. P. Felt); Plattsburg, New York, larvæ April 20, 1905 (H. G. Dyar); Mount Washington, New Hampshire (Mrs. A. T. Slosson); Dublin, New Hampshire, May, 1909 (A. Busck); White River, Ontario, June 25, 1907 (F. Knab); Field, British Columbia, August 15, 1903 (H. G. Dyar).

The coloration is subject to some variation. The abdominal pale bands are narrow in some specimens. In many specimens the pale scales of the head and mesonotum are uniformly ocherous yellow instead of being paler at the sides and posteriorly. In some specimens the short brown stripes at the sides of the antescutellar space are obsolete. Doctor Felt states that in the female the outer claw of the fore leg is simple (Bull. 79, N. Y. State Mus., 311, 1904). Our specimens, including a cotype, have both claws of the fore legs alike and each with a distinct tooth.

We have a single specimen from Field, British Columbia, that much resembles the specimens from Lake Superior, but owing to the fact that we have neither males nor larvæ of this form, and to the considerable geographical interval between the localities, we hesitate to make the identification positive.

AËDES ALDRICHI Dyar & Knab.

***Grabhamia spencerii* var. *idahoensis* Aldrich (not Theobald), in Theobald, Mon. Culicid., iii, 250, 1903.**

***Aëdes aldrichi* Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 57, 1908.**

***Aëdes aldrichi* Theobald, Mon. Culic., v, 620, 1910.**

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ORIGINAL DESCRIPTION OF AËDES ALDRICHI:

Similar to *A. hirsuteron* Theobald and *A. æstivalis* Dyar, but the vestiture of the occiput and the sides of the disk of the mesonotum are frosted white with a very slight yellowish cast; the anterior angles of the mesonotum are not brown-scaled; the abdomen has a distinct bronzy luster; the stems of the forked cells are longer; the species is smaller; otherwise the three species are very similar. Length, 3.5 mm.

Six specimens, all females, Market Lake, Idaho (J. M. Aldrich).

***Type.*—Cat. No. 12010, U. S. N. M.**

The specimens were sent us by Professor Aldrich mixed with *A. idahoensis* Theobald. Aldrich's remarks, quoted by Theobald,* obviously refer to this small species and not to *idahoensis*, which is larger. We take pleasure in naming this species for Prof. J. M. Aldrich.

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* Mon. Culicid., iii, 1903, p. 250.

DESCRIPTION OF FEMALE OF AËDES ALDRICHI (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderately long and slender, cylindrical, uniform, the labellæ conically tapered; vestiture black; setæ minute, curved, black, those on the labellæ more prominently outstanding. Palpi short, about one-fifth as long as the proboscis; vestiture black with faint bronzy luster; setæ moderate, bristly. Antennæ with the joints subequal, rugose, pilose, black, second joint longer than the succeeding one, slightly thickened and paler, partly covered with shining yellowish-white scales; tori subspherical, with a cup-shaped apical excavation, luteous brown, darker and with a patch of shining yellowish-white scales on inner side; hairs of whorls moderate, sparse, black. Clypeus broad, triangularly rounded, prominent, black, nude. Eyes black. Occiput black, broadly clothed with narrow curved scales, on the sides with broad flat ones, silvery white with a very faint yellowish tinge, without lateral dark patch, many short, erect, pale, forked scales on the nape; bristles along margins of eyes black, those projecting between eyes pale.

Prothoracic lobes elliptical, remote dorsally, black, clothed with narrow white scales and dark bristles. Mesonotum black, clothed with narrow curved scales, a broad median stripe and small subdorsal posterior stripes of bright bronzy-brown scales, those along anterior edge, sides of disk, and covering the antescutellar space yellowish white, the anterior angles not differently colored; dorsal stripe divided by a narrow line of pale scales. Scutellum trilobate, black, clothed with narrow, curved, silvery-white scales, each lobe with a group of pale bristles. Postnotum elliptical, prominent, blackish brown, shining, nude. Pleuræ black, coxæ luteous, clothed with patches of elliptical, flat, white scales and rows of pale bristles; scales on epimera of prothorax narrow, yellowish white.

Abdomen subcylindrical, flattened, tapering posteriorly; dorsal vestiture black with a slight violet and bronzy luster, with narrow white basal segmental bands slightly incised at the middle and widening to triangular patches on the sides; first segment with a patch of white scales and many pale setæ; venter sordid whitish scaled. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell about equal to its cell; basal cross-vein distant about its own length from anterior cross-vein; scales brown, black on costa, the outstanding ones broadly linear. Halteres whitish, the knobs infuscated.

Legs rather long and slender; femora whitish scaled basally and below, with bronzy-black scales above and a black ring before the tip; knees shining white; tibiæ largely yellowish white scaled below, bronzy black above, tips of hind pair black; tarsi brownish-black scaled, the basal joint with many pale scales beneath, becoming fewer outwardly, terminal joints entirely black; on hind tarsi the pale scales have a silvery luster and are continued to near the middle of the second joint. Claw formula, 1.1–1.1–1.1.

Length: Body 3.5 mm.; wing 3 mm.

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Professor Aldrich is quoted by Theobald, on what we believe to have been this species, as follows:

"It is so small that it readily crawls through ordinary mosquito screen. At the hotel in Market Lake it was found necessary to apply a thick coat of paint to the screens after they were in place; this reduced the size of the holes enough so that no further trouble was experienced in their coming through. It is a very annoying species, and seems to breed altogether in an arm of the Snake River which lies beside the little town, and which has no current except during the period of high water in the spring."

Idaho.

Market Lake (J. M. Aldrich); Lewiston, June 16, 1902 (J. M. Aldrich).

AËDES DECTICUS, new species.

DESCRIPTION OF FEMALE OF AËDES DECTICUS (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather long and slender, uniform; labellæ conically tapered; vestiture black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth as long as proboscis, vestiture black with faint violet luster, setæ moderate, bristly. Antennæ with the joints subequal, rugose, pilose, black; second joint thickened, third longer than succeeding ones; tori subspherical, with a cup-shaped apical excavation, blackish; hairs of whorls moderate, sparse, black. Clypeus broadly sub-triangular, rounded in front, prominent, black, nude. Eyes black. Occiput black, a narrow median line of narrow, curved, white scales, the rest broad, creamy white; two large quadrate black spots laterally, separated from a second spot on the sides by a broader band of white scales; nape with creamy scales and upright, black, forked ones; bristles along margins of eyes black, those at vertex paler.

Prothoracic lobes elliptical, remote dorsally, black, clothed with rather broad white scales and dark bristles. Mesonotum black, clothed with narrow, curved scales, very dark brown in a very broad median stripe divided by a narrow median line of pale yellowish ones, sides broadly, anterior margin narrowly and antescutellar region with yellowish scales, on each side of antescutellar space a dark stripe reaching forward to middle, separated from the median dark area by a narrow line of yellow scales. Scutellum trilobate, black, clothed with narrow, curved, pale-yellowish scales, each lobe with a group of pale bristles. Postnotum elliptical, prominent, blackish-brown, nude. Pleuræ black, coxæ luteous, clothed with patches of elliptical white scales and rows of pale bristles.

Abdomen subcylindrical, tapering posteriorly; dorsal vestiture black, without luster, the segments with large dirty-white basal lateral triangular spots; first segment dorsally with dull-white scales and pale hairs; venter dull black with creamy-white basal segmental bands, broad on basal segments, narrower on distal ones; cerci black.

Wings rather narrow, hyaline with slight smoky tinge; petiole of second marginal cell less than half the length of its stem, that of second posterior cell nearly equal to its cell; basal cross-vein distant slightly more than its own length from the anterior cross-vein; scales deep brown, on costa with slight violet luster, the outstanding ones narrowly ligulate, truncate at tip. Halteres whitish, the knob infuscated.

Legs slender and rather long, the vestiture brownish black with a slight violet luster; femora pale at base and beneath nearly to tip. Claw formula, 1.1–1.1–1.1.

Length: Body about 4 mm.; wing 3.8 mm.

Type: No. 12280, U. S. Nat. Mus.

Life history and habits unknown.

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Forested region North of Lake Superior, Canada.
White River, Ontario, June 25, 1907 (F. Knab).
We possess only a single specimen of this distinct species.

AËDES PULLATUS (Coquillett) Dyar & Knab.

Culex impiger Dyar (not Walker), Proc. Ent. Soc. Wash., vi, 37, 1904.
Culex impiger (no. 1) Dyar & Knab (not Walker), Proc. Ent. Soc. Wash., vi, 144, 1904.
Culex pullatus Coquillett, Proc. Ent. Soc. Wash., vi, 168, 1904.
Culex pullatus Dyar, Journ. N. Y. Ent. Soc., xii, 245, 1904.
Culicada pullatus Felt, Bull. 79, N. Y. State Mus., 391*b*, 1904.
Grabhamia pullatus Dyar, Proc. Ent. Soc. Wash., vii, 48, 1905.
Culicada pullatus Felt, Bull. 97, N. Y. State Mus., 448, 468, 478, 1905.
Culex pullatus Blanchard, Les Moust., 630, 1905.
Aëdes pullatus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 201, 1906.
Ochlerotatus pullatus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 19, 1906.
Ochlerotatus pullatus Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 5, 1906.
Culicada pullatus Theobald, Mon. Culic., iv, 4, 1907.
Culex pullatus Theobald, Mon. Culic., v, 628, 1910.

ORIGINAL DESCRIPTION OF CULEX PULLATUS:

♀.—Near *punctor* and *impiger*, but the bristles of the scutellum are chiefly black instead of yellow, etc. Black, the halteres and femora largely yellowish. Scales of palpi black, those on the occiput pale yellow, the upright ones in the middle yellow, those on the sides and the bristles black. Scales of the mesonotum golden yellow, the sides with a few lighter colored ones, the bristles and those of the scutellum chiefly black. Scales of abdomen black and with a tinge of violet, a crossband of whitish ones at base of each segment, dilated at each end, scales of venter whitish, a few black ones in hind angles of the segments. Scales of coxae and on lower part of anterior, and posterior sides of the femora yellowish white, on upper part of femora and toward their apices chiefly black; scales of tibiae blackish and mixed with a few yellowish ones, those on the tarsi blackish; all tarsal claws toothed. Wings hyaline, the scales brown, lateral scales of the veins narrow and almost linear, petiole of first submarginal cell nearly as long as this cell, hind cross-vein about its length from the small. Length 4.5 mm.

♂.—Palpi slender, the scales and hairs black, the latter, like those of the antennae, appear whitish in certain lights; proboscis reaching slightly beyond apex of palpi. Mesonotum with a pair of subdorsal bare vittae on its anterior two-thirds. Abdomen with a cross-band on the apices of ventral segments 3 to 7. Petiole of the first submarginal cell longer than the cell. Otherwise as in the female.

Kaslo, British Columbia. One female and ten males bred from the larvae, June 8 to 16, by Dr. H. G. Dyar; also ninety females and thirty-three males bred from the pupae, or captured, by Dr. Dyar.

Type.—No. 8030, U. S. National Museum.

Although so similar to *punctor* and *impiger* in the adult state, the larva is very different, as Dr. Dyar has pointed out to me.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES PULLATUS:

Female.—Proboscis rather long and slender, subcylindrical, uniform; labellæ conically tapered; vestiture brown; setæ minute, curved, black, those on the labellæ more prominently outstanding. Palpi short, about one-fifth as long as proboscis; vestiture black; setæ moderate, bristly, black. Antennæ with the joints subequal, rugose, pilose, black, the second somewhat enlarged; tori small, subspherical, with a cup-shaped apical excavation, ferruginous, with a patch of small white scales on inner side; hairs of whorls rather short, sparse, black. Clypeus short, roundedly triangular, nude, black. Eyes black. Occiput black, broadly clothed with narrow, curved, dull ochreous scales on vertex, broad flat paler ones on the sides, without black lateral patch, many erect, forked, pale yellowish scales on the nape; setæ along margins of eyes black, those projecting forward at the vertex pale.

Prothoracic lobes elliptical, remote dorsally, black, clothed with broad, curved, whitish scales and black bristles. Mesonotum black, clothed with narrow, curved, pale ochreous-brown scales shading paler towards sides and about antescutellar space, a pair of ill-defined, submedian, narrow, darker longitudinal stripes, a

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pair of shorter dark stripes posteriorly at sides of antescutellar space; a median linear stripe devoid of scales and varying in distinctness; submedian stripes long but not reaching anterior margin, sublateral pair short, confined to posterior half; bristles numerous, moderate, black. Scutellum trilobate, black, clothed with pale-yellow scales, each lobe with a group of long brown bristles. Postnotum elliptical, prominent, black, slightly pruinose. Pleuræ and coxæ black, clothed with narrow curved yellowish scales above and elliptical, flat, white scales below, and rows of pale bristles.

Abdomen subcylindrical, flattened, tapering posteriorly; dorsal vestiture of bluish-black scales, each segment with a narrow basal white band which widens somewhat laterally, the first segment with white scales and many pale setæ; venter yellowish-white scaled, with segmental brown-black patches at apical angles, in some specimens extended to complete transverse bands. Cerci black.

Wings rather narrow, hyaline; petiole of second marginal cell a little shorter than its cell, that of second posterior cell a little longer than its cell; basal cross-vein about its own length distant from anterior cross-vein; scales deep brown, black on costa, except a small patch at base below the costal vein, which is white; outstanding scales broadly linear, deep brown. Halteres whitish.

Legs slender and rather long; femora largely black scaled above, yellowish-white below to near apex, extreme tips white; tibiæ with deep brown and yellowish-white scales intermixed, the pale scales predominating on under side; tarsi deep brown scaled, the proximal joints largely pale scaled beneath and the black scales increasing outwardly, the terminal joint wholly black. Claw formula, 1.1–1.1–1.1.

Length: Body about 5.5 mm.; wing 5 mm.

Male.—Proboscis straight, long and slender, bronzy-black scaled. Palpi nearly as long as proboscis, the apex of long joint and the last two joints slightly enlarged; vestiture bronzy-black, long hairs at end of long joint and on last two joints abundant and black. Antennæ plumose, the last two joints long, slender, rugose, pilose, black, the others short, entirely blackish; hairs of whorls long, black. Coloration similar to the female. Abdomen elongate, depressed, with coarse and long brown lateral ciliation; segmental white bands of dorsum much produced posteriorly on lateral margins; ventral black bands medianly triangularly produced. Wings much narrower than in the female, the stalks of the fork-cells longer, the vestiture sparse. Claw formula, 1.1–1.1–1.1.

Length: Body about 6 mm.; wing 5 mm.

Genitalia (plate 26, fig. 182); Side-pieces three times as long as wide, tip rounded; apical lobe broadly prominent, continued very broadly to the base, where a slight expansion indicates the basal lobe. Clasp-filament slender, slightly expanded medianly, with a moderate articulated terminal spine. Harpes concave, curved, thickened at tip and slightly cleft. Harpagones with a long columnar base angled in middle, the outer half arising from the inner at the bend, which is rounded over and setose, a terminal, rather short, articulated filament with rounded lateral expansion. Unci approximate, revolute, forming a short, broad, basal cylinder. Basal appendages remote, short, bearing several stout spines.

Larva, Stage IV (plate 117, fig. 402).—Head rounded, narrowed before eyes, a notch at insertion of antennæ, front margin broadly arcuate. Antennæ moderate, subcylindrical, slender, spined all over; tuft moderate, a little before middle; four irregular apical spines and a short process. Eyes large, transverse, pointed. Both pairs of dorsal head-tufts and ante-antennal tufts multiple. Mental plate triangular, with a central tooth and ten on each side, the basal ones more remote, the last two small and well separated. Mandible quadrangular, a group of short spines at base; two filaments before tip; an outer row of cilia

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from a collar; fourteen filaments on outer edge; dentition of three teeth, first and third longer, the usual fourth rudimentary; a process before, three teeth at base, a broad serrate filament and six serrate hairs within; process below cleft-furcate, with hairs at tip, a row of hairs at base; a sharp basal angle; six hairs in two groups within; a row of stout hairs at base. Maxilla elongate hemispherical, divided by a suture; inner half hairy, a row of hairs up the sides and a series of short erect ones on the edge, a tuft of long, stout hairs at tip; outer half with some hair, two long filaments near the suture, and a spine on the other side; palpus oblique, with four small digits, the inner two smallest. Thorax rounded, a little wider than long; hair abundant, some of the single lateral ones long. Abdomen moderate, the anterior segments shorter; hairs slight, the lateral ones of first two segments double, the rest single; tracheal tubes broad, band-shaped, slightly expanded in the segments. Air-tube stout, tapered beyond base, about three times as long as wide; pecten not reaching to middle, of uniformly spaced teeth, followed by a single tuft of about eight hairs; single spine long, with wide base and one to three basal branches. Lateral comb of eighth segment of many scales in a triangular patch; single scale elongate, fringed with coarse spinules, the apical one distinctly the longest. Anal segment longer than wide, dorsal plate reaching two-thirds of the way down the sides, sinuate on lateral margin; dorsal tuft a brush and hair on each side; a single lateral hair; ventral brush well developed, with a few short tufts preceding barred area; anal gills long, ensiform, twice as long as the segment.

Larva, Stage I.—Head elliptical, rounded; mouth-brushes well-developed; eyes small, elongate elliptical. Thorax rounded, enlarged; abdomen submoniliform, hairs moderately long, single, the lateral ones double on segments 1 to 4, gradually becoming shorter and weaker posteriorly. Lateral comb of eighth segment a single row of short, stout, pointed-tipped spines. Air-tube three times as long as wide, conical at tip, with short, simple basal pecten and hair beyond. Anal segment with dorsal tuft paired, two hairs in each half; no ventral brush; four anal processes longer than the segment.

The larvæ develop in the early spring in pools from melting snow, hatching from overwintering eggs. There is but a single annual brood, the females living two or three months and inhabiting forests. They are practically all gone at lower altitudes by August, but in higher altitudes or cool places may be found later. Dr. Dyar says:

"Early pools in the mountains, filled by the drainage from the melting snow banks, contained the larvæ and pupæ, apparently by the million. Near Kootenay Lake they had all gone in May; but higher in the hills larvæ could still be found till the middle of June, and at Kokanee Mountain, at the foot of the glacier, I found many larvæ on August 10. The adults soon became very common in the woods, though in a few weeks they were much worn and later disappeared, except in the high damp valleys where they persisted longer. Eggs were obtained of the usual spindle shape but shorter and thicker than those of *C. cantans* [=*Aëdes sansoni*]. They were laid singly and hibernated."

Northern Rocky Mountain region.

Kaslo, British Columbia, June to August, 1903 (H. G. Dyar); Juliaetta, Idaho, April 21, 1899 (J. M. Aldrich); Summit, Placer County, California, July 19, 1915 (H. G. Dyar).

This species has undoubtedly a wider distribution than indicated by our localities. Our collections, however, are useless in this group unless they contain males or larvæ, which is rarely the case. As in other species, there is indication of variation in the coloration of the adults. This is particularly true of the dark stripes of the mesonotum, which show a tendency to become obsolete.

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AËDES ÆSTIVALIS (Dyar) Dyar & Knab.

Culex reptans Dyar (not Linné, not Meigen), Proc. Ent. Soc. Wash., vi, 38, 1904.
Culex æstivalis Dyar, Journ. N. Y. Ent. Soc., xii, 245, 1904.
Grabhamia æstivalis Dyar, Proc. Ent. Soc. Wash., vii, 48, 1905.
Grabhamia æstivalis Dyar, Journ. N. Y. Ent. Soc., xiii, 54, 1905.
Aëdes æstivalis Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 201, 1906.
Ochlerotatus æstivalis Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.
Ochlerotatus æstivalis Dyar, U. S. Dept. Agr., Bur. Ent., Circ. 72, 6, 1906.

ORIGINAL DESCRIPTION OF CULEX ÆSTIVALIS:

I propose this name for the species called *Culex reptans* in my article on British Columbian mosquitoes (Proc. ent. soc. Wash., vi, 38, 1904). It is clearly not the European *reptans* (*nemorosus*), nor is it *lazarensis* Felt & Young, which has a peculiar larva that I had not seen till I examined a specimen kindly sent to me by Dr. Felt. The larva of *æstivalis* is characterized by the air tube being about three times as long as wide, the pecten without detached teeth, followed by the tuft; anal segment almost completely ringed by the plate, the barred area running nearly to the base, two tufts before it practically reaching base; comb of the eighth segment a large patch of thorn-shaped spines fully three rows deep.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES ÆSTIVALIS:

Female.—Proboscis moderate, subcylindrical, uniform, the labellæ conically tapered; vestiture black, setæ on labellæ minute, outstanding. Palpi short, about one-fifth as long as the proboscis, black; setæ moderate, bristly. Antennæ slender, the joints subequal, rugose, pilose, black; second joint slightly thickened and yellowish; tori subspherical, with a cup-shaped excavation, luteous, darker and with pale scales on inner side; hairs of whorls sparse, moderate, black. Clypeus short, broad, rounded triangular, black, nude. Eyes black. Occiput black, broadly clothed on the vertex with narrow, curved, dull creamy scales, on the sides broad, yellowish white ones, with an ill-defined lateral black patch, many short, erect, forked, pale scales on the nape; bristles along margins of eyes black, those projecting between the eyes pale.

Prothoracic lobes elliptical, remote dorsally, black, clothed with lanceolate, yellowish-white scales and dark bristles. Mesonotum black, clothed with narrow, curved scales, creamy white and golden brown; a broad median stripe and on posterior third narrow sublateral stripes of golden-brown scales, scales along anterior edge, sides of disk and about antescutellar space yellowish white; humeral angles golden-brown-scaled. Scutellum trilobate, black, clothed with narrow curved yellowish-white scales, each lobe with a group of brown bristles. Postnotum elliptical, prominent, blackish, nude. Pleuræ black, coxæ luteous, clothed above with narrow, curved yellowish scales, below with patches of broadly elliptical, flat, white scales and rows of pale bristles.

Abdomen subcylindrical tapering posteriorly; dorsal vestiture black, with rather narrow white basal segmental bands which widen to triangular patches on sides, the first segment with white scales and with numerous fine pale hairs; venter entirely whitish scaled. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell much shorter than its cell, that of second posterior cell also shorter than its cell; basal cross-vein distant about its own length from anterior cross-vein; scales deep brown, the outstanding ones broadly linear. Halteres pale, with whitish knobs.

Legs moderately long and slender; femora yellowish-white scaled below, with black ones above and a black ring before the tip; knees white; tibiæ largely whitish scaled below, black above, tips of hind pair black; tarsi bronzy brown scaled, beneath with many pale scales forming a distinct line on first two segments and becoming fewer outwardly, the terminal joints entirely dark. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis moderate, straight, bronzy-brown scaled. Palpi exceeding the proboscis by the length of the last joint; end of long joint and last two joints

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somewhat swollen; vestiture deep bronzy brown; long hairs on end of long joint and the last two joints long and abundant, deep brown with a pale reflection in certain lights. Antennæ plumose, the last two joints long and slender, pilose, the others shorter, blackish; hairs of whorls long dense, brownish black. Coloration similar to the female. Abdomen elongate, depressed; dorsal white bands broader than in the female; lateral ciliation dense, fine, pale yellow. Wings narrower than in the female, stems of the fork-cells longer, but still shorter than their cells; vestiture less abundant. Posterior tibiæ with a fringe of rather long dense hairs. Claw formula, 2.1–2.1–1.1.

Length: Body about 5 mm.; wing 4 mm.

Genitalia (plate 27, fig. 183): Side-pieces more than twice as long as wide; apical lobe well developed, prominent, continued broadly along side-piece to basal lobe, which is conically prominent and bears numerous setæ, a stout hooked spine with an attendant group of smaller spines. Clasp-filament slender, moderate, slightly expanded in middle, notched towards apex and bearing a few fine setæ, a long articulated terminal spine. Harpagones with a stout, thick, nearly straight columnar base with two small setæ on inner side, bearing an articulated terminal filament, short and widened in the middle. Harpes elliptical, concave, curved, inner margin thickened and revolute, tip pointed and curved outward. Unci approximate, revolute, forming a large basal cone. Basal appendages remote, bearing four or five stout terminal setæ.

Larva, Stage IV (plate 120, fig. 413).—Head rounded, widest through eyes; antennæ rather small, uniform, minutely spinulated; hair-tuft small, situated before middle; both pairs of dorsal head-hairs single, ante-antennal tufts in fives. Lateral abdominal hairs in twos on second to sixth segments. Tracheal tubes broad. Lateral comb of eighth segment of about twenty-five scales in a patch, the single scale shortly fringed laterally, with a long sharp apex, as long as body of scale. Air-tube rather less than three times as long as wide, slightly tapering outwardly; pecten of evenly spaced teeth reaching slightly beyond middle of tube, followed by a single small tuft of about five hairs. Anal segment longer than wide, with a large dorsal plate that reaches to near the ventral line; dorsal tuft a long hair and tuft on each side; ventral brush with small tufts preceding the barred area; anal gills long, tapering, pointed, equal.

The adults flew later in the season than those of *Aëdes pullatus* and showed more of a tendency to enter the house. The larvæ were obtained the next season from eggs laid by captured females, so that it is probable that there is but a single annual generation with hibernation in the egg state, the larvæ breeding in the early spring pools, but perhaps not emerging so early. They were not found in nature. Dr. Dyar says:

"This species appeared rather late in the season, no examples being seen till the end of June, after which it became fairly abundant. The flies were persistent in their attacks, alighting and biting at once, without the preliminary deliberations seen in other species. . . . . This is the summer mosquito of the Kootenays and lasted longer than any other of the single-brooded species. Eggs were obtained of the usual spindle shape, rather thick and unusually small, laid singly. They have hibernated."

Northern Rocky Mountains, in Canada.

Kaslo, British Columbia, end of June to August, 1903 (H. G. Dyar); Nanoose Bay, Vancouver Island, British Columbia, August 1, 1903 (J. Fletcher).

Aëdes æstivalis has no doubt a wider distribution than indicated by our localities. It is impossible to determine accurately species in this group from captured females in indifferent condition such as usually received. We have therefore omitted doubtful records, but consider it safe to refer here the speci-

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mens from Nanoose Bay. This species is inseparable from *Aëdes hirsuteron*, either by the coloration of the adults, or male genitalic characters. The larvæ, too, are similar, but differ in the head-hairs. This, together with the different distribution, causes us to hold the species separate, at least until the receipt of fresh material.

AËDES HIRSUTERON (Theobald).

Culex hirsuteron Theobald, Mon. Culic., ii, 98, 1901.
Culex hirsuteros Giles, Handb. Gnats or Mosq., 2 ed., 451, 1902.
Culex reptans Smith (not Linné, not Meigen), Bull. 171, N. J. Agr. Exp. Sta., 38, 1904.
Culex pretans Grossbeck, Ent. News, xv, 332, 1904.
Culex pretans Smith & Grossbeck, Psyche, xii, 17, 1905.
Culex pretans Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 291, 1905.
Culex pretans Britton & Viereck, Rept. Conn. Agr. Exp. Sta., 1904, 271, 273, 274, pl. xii, 1905.
Culex hirsuteron Theobald, Gen. Ins., Dipt., fasc. 26, 27, 1905.
Culex hirsuteron Blanchard, Les Moust., 350, 1905.
Culex pretans Blanchard, Les Moust., 630, 1905.
Aëdes pretans Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 201, 1906.
Ochlerotatus pretans Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 18, 1906.
Ochlerotatus hirsuteron Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.
Culicada pretans Theobald, Mon. Culic., iv, 353, 1907.
Culex (Ochlerotatus) pretans Viereck, 1st Ann. Rept. Comm. Health Pa., 470, 1908.
Ochlerotatus pretans Dyar, U. S. Dept. Agr., Bur. Ent., Circ. 72, 6, 1906.
Aëdes pretans Thibault, Proc. Ent. Soc. Wash., xii, 18, 1910.
Culicada pretans Theobald, Mon. Culic., v, 305, 1910.
Culex hirsuteron Theobald, Mon. Culic., v, 358, 1910.
Aëdes pretans Morse, Ann. Rept. N. J. State Mus., 1909, 719, 1910.

ORIGINAL DESCRIPTION OF CULEX HIRSUTERON:

Thorax brown, with scattered creamy scales (a dark median stripe when denuded). Abdomen deep brown with basal bands of white scales, except on the last two segments, which have a basal patch of white scales on each side. Ungues of ♀ all uniserrated, simple.

♀. Head dark brown, densely covered with creamy curved scales in the middle and with scattered upright forked ones, sides of the head with a small patch of almost black flat scales; antennæ nearly brown, with pale pubescence, the first two basal joints being clear testaceous, the basal one having a few pale scales upon it on the inner side; palpi covered with brown to almost black scales; proboscis very dark brown, faintly testaceous at the base; clypeus deep testaceous; eyes black, in some with gold and silver reflections.

Thorax brown, with scattered curved creamy scales, when denuded showing a dark stripe in the middle; scutellum paler brown, with a few curved creamy scales and bright brown bristles; metanotum deep chestnut-brown, with more or less purplish reflections; pleurae dark testaceous-brown, with patches of creamy-white scales.

Abdomen covered with deep brown scales, with a purplish reflection under the microscope, with a basal band of white scales to each segment, except the last two, which have a basal patch of white scales on each side; posterior borders with pale hairs, but brown in some lights; on the venter the abdomen is paler brown, with scattered creamy-white scales.

Legs brown, unbanded; coxae chestnut-brown, with a few white scales; femora ochraceous, with scattered dusky-brown scales, but with white scales beneath, the rest of the legs brown; ungues of the fore, mid and hind legs equal, thick, uniserrated. In some specimens the legs are paler brown than in others, and there is a pale knee spot on the hind legs in one of the series.

Wings with long brown scales, testaceous at the root, rather more densely scaled than usual in the genus *Culex;* first sub-marginal cell very little longer and narrower than the second posterior cell, its stem slightly shorter than the fork; the base of the second posterior cell a little nearer the base of the wing than that of the first sub-marginal cell, its stem a little shorter than the cell; posterior cross-vein more than its own length distant from the mid cross-vein, the latter longer than the supernumerary cross-vein. Halteres ochraceous.

Length.—3 to 3.5 mm.

Habitat.—Woodstock, Virginia, U. S. A. (F. C. Pratt).

Time of capture.—June.

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Observations.—Professor Howard kindly sent four of this species from the United States National Museum. It is a small gnat, quite distinct from any I have seen outside the American Continent, and may at once be told by its compactness, its banded abdomen, and the wing venation and densely scaled wings. They were sent by him under the name *C. pungens*, Wied., but they do not answer at all to the short description of that species, nor do they agree with either Howard's or Coquillett's specimens, for in both Howard's figure of *C. pungens* and Coquillett's table of North American species we find the ♀ has simple, not uniserrated ungues. I can find no species described answering to those sent by Professor Howard.

ORIGINAL DESCRIPTION OF CULEX PRETANS:

♀.—Head brown, occiput almost covered with pale yellow scales, some of which collect in a distinct border to the eyes, and with a small patch of dark brown scales on each side; antennæ dark brown, the basal two joints pale testaceous; proboscis and palpi dark brown, the terminal joint of the latter almost obsolete. Mesonotum brown with numerous yellowish scales and a usually well defined, broad median vitta of brown scales, which does not quite reach the anterior margin and is slightly constricted centrally; there are two other patches of scales of the same color, about one-third the length of the thorax, at the base of this vitta, separated from it by a narrow line of yellow scales; scutellum brown, with many yellowish bristles; metanotum evenly dark brown; pleura dark brown, with patches of pure white scales; halteres yellowish white, brown at the apex. Abdomen brownish black, the segments with narrow whitish basal bands, which become wide at the sides; beneath it is clothed with dirty white scales, mixed with some brown ones near the apical margin of the segments. The bands are usually clearly defined, and though narrow, are rarely obsolete. Legs with coxæ yellowish; femora brown above, creamy white beneath, and with a dot of the same color at the knee; tibiæ dark brown above, yellowish beneath; tarsi wholly brownish black; claws uniserrated on all feet; wings hyaline, petiole of first submarginal cell about half as long as this cell. Length 5 mm.

Described from fifteen females, one of which, with a male, was bred from larvæ.

Habitat: Chester, Trenton, Lake Hopatcong, and Great Piece Meadows—all in New Jersey.

Types: in the collection of the New Jersey Experiment Station.

The only male was dissected; in color it does not differ from the female, but the thoracic stripe is slightly diffused and the abdominal banding is broader and less defined. The palpi are uniformly brown; the claws of the anterior and mid feet unequal, the larger biserrated, the smaller uniserrated, while the posterior ones are equal and uniserrated. Petiole of first submarginal cell not quite the length of this cell. Length 5.3. mm.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES HIRSUTIBON:

Female.—Proboscis moderately long and slender, subcylindrical, uniform; labellæ conically tapered; vestiture black; setæ on labellæ minute, outstanding. Palpi short, about one-fifth as long as proboscis, black, the setæ moderate, bristly. Antennæ slender, the joints subequal, rugose, pilose, black, second joint slightly thickened and paler; tori subspherical, with a cup-shaped excavation, luteous, darker within with a patch of whitish scales; hairs of whorls moderate, sparse, black. Clypeus rounded triangular, prominent, black, nude. Eyes black. Occiput black, broadly clothed with narrow, curved, yellowish white scales, on the sides broad, creamy white ones, with well-defined lateral black patch, many short, erect, forked pale scales on the nape; bristles along margins of eyes black, those projecting between the eyes pale.

Prothoracic lobes elliptical, remote dorsally, black, clothed with narrow yellowish-white scales and dark bristles. Mesonotum black, clothed with narrow, curved scales, a broad median stripe and short sublateral ones posteriorly above roots of wings of bright bronzy-brown scales, the humeral angles also brown; scales along anterior edge, sides of disk, and about the antescutellar space yellowish white. Scutellum trilobate, black, clothed with narrow, curved yellowish-white scales, each lobe with a group of pale brown bristles. Postnotum elliptical, prominent, blackish, nude. Pleuræ black, coxæ luteous, clothed with patches of elliptical, flat, white scales and rows of pale bristles, some narrower yellowish scales along upper margin.

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Abdomen subcylindrical, tapering posteriorly; dorsal vestiture black, with rather narrow white basal segmental bands which widen to triangular patches on the sides, the first segment with white scales and numerous fine pale hairs; venter entirely white-scaled. Cerci prominent, black.

Wings moderate, hyaline; petiole of second marginal cell slightly shorter than its cell, that of second posterior cell about as long as its cell; basal cross-vein distant about its own length from anterior cross-vein; scales brown, black on the costa, the outstanding ones broadly linear. Halteres whitish, with darker knobs.

Legs moderately long and slender; femora yellowish-white scaled below, black above and with a black ring before tip; knees white scaled; tibiæ largely pale scaled below, black above, the tips of hind pair black; tarsi brown with submetallic luster and with pale scales beneath becoming indistinct outwardly. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis slender and straight, rather long. Palpi exceeding the proboscis by the length of the last joint; end of long joint and last two joints somewhat swollen; vestiture brown; hairs on end of long joint and the last two joints long and abundant, brown with a whitish reflection in certain lights. Antennæ plumose, the last two joints long and slender, pilose, the others shorter, blackish; hairs of whorls long dense, brownish-black with silky luster. Coloration similar to the female. Abdomen long, depressed, the white segmental bands wider than in the female and more produced laterally; lateral ciliation long, fine and abundant, pale yellow. Wings narrower than in the female, stems of fork-cells longer, vestiture less abundant. Posterior tibiæ with a fringe of long, fine, rather dense hairs. Claw formula, 2.1–2.1–1.1.

Length: Body about 5 mm.; wing 4 mm.

Genitalia (plate 26, fig. 180): Side-pieces nearly three times as long as wide; apical lobe well developed, prominent, continued broadly along side-piece to basal lobe, which is conically prominent and bears numerous short setæ, a stout hooked spine with an attendant group of smaller spines. Clasp-filament slender, moderate, slightly thickened medianly, notched towards apex and bearing a few fine setæ, a long, articulated terminal spine. Harpagones with a stout, thick, nearly straight, curved columnar base with two small setæ on inner side, minutely setose, bearing an articulated terminal filament, short, widened in the middle. Harpes elliptical, concave, curved, inner margin thickened and revolute, tip pointed and curved outward. Unci approximate, revolute, forming a small basal cylinder. Basal appendages remote, bearing four or five stout terminal setæ.

Larva, Stage IV (see figure of the entire larva, plate 71).—Head rounded, narrowing slightly before eyes, a slight notch at insertion of antennæ, front margin broadly arcuate. Antennæ moderate, slightly swollen at base, spined all over with large and small spines, the small spines in rows; tuft moderate, before the middle; four short terminal spines of different lengths, one long one, and a short rounded process. Eyes large, transverse, pointed. Upper pair of dorsal head-tuft with three hairs, lower pair with two hairs, ante-antennal tufts multiple. Mental plate broadly triangular, apical half less steeply angled; a central tooth and seventeen on each side, the basal five much larger and widely spaced. Mandible quadrangular, a few spines outwardly; two long filaments toward tip in front of a thorn-shaped notch; a row of cilia outwardly from a collar; fifteen filaments on outer margin, the basal three fringed; dentition of four teeth on a process, nearly equal; three filamentous processes before, a tooth at base with a short furcation, a broad filament and five fringed ones within; process cleft-furcate, with tufts of hair and a row of five sparsely placed hairs; angle below rounded; four filamentous hairs within; a row of long hairs at base. Maxilla conical, divided by a suture; inner half with a slight notch above, densely hairy

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except toward the suture, a row of stout spines on inner edge, a brush of long hair at the tip; outer half with a fringe of little hairs next the suture above, an irregular patch below, two filaments adjacent to the suture at the middle, a spine on the other side, a row of serrations on margin next the palpus; palpus short, thick, with four minute terminal digits and a central rounded elevation. Thorax rounded, transverse, wider than long, hairs rather abundant, moderate, the subdorsal prothoracic hairs a small tuft followed by a single long hair. Abdomen stout, rather long, the anterior segments shorter; hairs sparse, the laterals double to fifth segment, single on sixth; secondary hairs moderate; tracheal tubes broad, band-shaped, expanded in the segments. Air-tube stout, slightly tapered on apical half, about three times as long as wide; pecten reaching to middle, uniform, without detached teeth; pecten tooth a long spine with broad base and a basal branch; a single tuft of about five hairs following the pecten. Lateral comb of eighth segment of rather numerous scales in a patch; single scales broadly elliptical, fringed outwardly with short spines and with a single long stout apical spine. Anal segment about as long as wide; dorsal plate reaching near the ventral line, with an even margin; dorsal tuft a brush and rather long hair on either side; ventral brush well developed, with short tufts preceding barred area towards base; a single small lateral hair; anal gills moderate, ensiform, about twice as long as anal segment.

The larvæ develop in the pools of early spring from overwintering eggs. There is but one brood in the season. Britton and Viereck, in Connecticut, found this species in great abundance; they say:

"Has formerly been regarded as a comparatively rare woodland species. At Hartford we found it breeding by the million in wooded pools at south meadows, from which it spread into the adjoining portion of the city, becoming the most troublesome mosquito."

In 1905 Dyar and Knab visited the locality on the outskirts of Hartford indicated by Britton and Viereck. On April 25th the brood was already well advanced and pupæ predominated over larvæ. Associated with them were a few larvæ of *Aëdes fuscus*, these being still small. The appearance and development of the larvæ of *Aëdes hirsuteron*, according to our experience, is about coincident with *Aëdes canadensis*, the former, however, being much more local. Smith reports the species as rather rare in New Jersey and captures of adults as late as September 10th and 16th. We have well preserved specimens taken in July and August, which indicates that, as in other species overwintering in the egg state, a part of the eggs fail to hatch in the spring and do so later, when the pools are again filled by rains. Thibault observed the species in Arkansas and says:

"An early mosquito, sometimes abundant in suitable places. In thickets and grassy places and about dwellings. Does not enter houses. Breeds in transient grassy pools in fields and thickets. An eager biter. Taken in March, April, and May, and after rains throughout the summer, though only sparingly after May. Males appear first and are at all times more plentiful than females."

Eastern United States, from New Hampshire southward to Texas.

Dublin, New Hampshire, June, 1905 (A. Busck); South Amherst, Massachusetts, July 10, 1903 (G. Dimmock); Westfield, Massachusetts, July 14, 1903 (F. Knab); Chicopee, Massachusetts, July 8, 1903 (F. Knab); Hartford, Connecticut, larvæ April 25, 1905 (Dyar and Knab); Great Piece Meadow, New Jersey, April 27 (J. B. Smith coll.); Herzog's Island, Potomac River, Maryland, April 26, 1903 (W. V. Warner); Woodstock, Virginia, June 2, 1903, August 4, 1904 (F. C. Pratt); Paris, Texas, April 4, 1904 (A. A. Girault).

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Reported also from Trenton, Lake Hopatcong and Chester, New Jersey (J. B. Smith); Scott, Arkansas (Thibault).

We possess specimens from the same locality as Theobald's types of *hirsuteron* and we have cotypes of Grossbeck's *pretans* and find that both represent but one species. The species has an unusually southern distribution for a species of this group. It is represented in the northern Rocky Mountain region by *Aëdes æstivalis*, to which it is closely allied, yet apparently distinct on larval characters.

AËDES CENTROTUS, new species.

DESCRIPTION OF FEMALE OF AËDES CENTROTUS (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather long and slender, uniform; labellæ conically tapered; vestiture black, with a faint brownish luster; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth as long as the proboscis; vestiture dull black, with scattered reddish-brown scales and a few bristles. Antennæ filiform, the joints subequal, rugose, pilose, black; second joint longer than succeeding one, slightly thickened and luteous basally; tori subspherical, with a cup-shaped apical excavation, brown, rather densely clothed with pale lanceolate scales; hairs of whorls rather short, sparse, black. Clypeus broadly triangular, rounded in front, blackish, nude. Eyes black. Occiput black, clothed with dull ocherous yellow scales, narrow curved ones nearly all over, nape with many creamy-white, upright forked scales, a few blackish ones intermixed towards sides; sides clothed with broad, flat, dirty creamy white scales. Bristles along margins of eyes black, those at vertex paler.

Prothoracic lobes elliptical, remote dorsally, clothed with yellowish and whitish lanceolate scales and coarse black bristles. Mesonotum black, clothed with coarse, narrow curved scales, predominatingly golden brown, becoming more yellowish over the roots of wings and around the antescutellar space; a rather broad median deep brown stripe, becoming indistinct posteriorly; a short brown stripe at sides above roots of wings. Scutellum trilobate, black, clothed with narrow curved pale-yellowish scales, each lobe with a group of pale bristles. Postnotum elliptical, prominent, blackish brown, nude. Pleuræ blackish, coxæ luteous, with rows of pale bristles, clothed with patches of elliptical, flat, white scales, at anterior angles with narrow, curved golden brown scales.

Abdomen subcylindrical, tapering posteriorly; dorsal vestiture black, the segments with rather narrow, basal creamy-white bands, which expand laterally, first segment with dull creamy white scales and with many pale hairs; venter creamy-white, with broad, apical, segmental black bands which are produced medianly to form a longitudinal stripe. Cerci black.

Wings moderately broad, hyaline; petiole of second marginal cell more than half the length of cell, that of second posterior cell longer than its cell; basal cross-vein distant about its own length from anterior cross-vein; scales brownish-black, the outstanding ones very narrowly ligulate. Halteres with whitish stem and dark-brown knob.

Legs slender and rather long; vestiture black, with faint bronzy luster; femora pale at base and beneath nearly to tip; knees narrowly white; tibiæ and bases of first tarsal joints sprinkled with paler scales beneath. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4.4 mm.

Type: No. 12281, U. S. Nat. Mus.

The life-history is unknown.

Mr. Knab took a series of 30 females that came to bite in the daytime in the forest.

Forested region north of Lake Superior, Canada.

White River, Ontario, June 24, 1907 (F. Knab).

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The thoracic pattern and abdominal banding, as in other species, are subject to considerable variation. Without a good series of bred specimens it will be impossible to indicate the range of variation or the specific limits.

AËDES PROVOCANS (Walker).

Culex provocans Walker, List Dipt. Brit. Mus., i, 7, 1848.
Culex provocans Giles, Gnats or Mosq., 327, 1900.
Culex nemorosus Theobald (in part), Mon. Culic., ii, 80, 1901.
Culex nemorosus Giles (in part), Gnats or Mosq., 2 ed., 436, 1902.
Culex nemorosus Felt (not Meigen), Bull. 79, N. Y. State Mus., 332, 1904.
Theobaldinella nemorosa Blanchard (in part), Les Moustiques, 391, 1905.
Ochlerotatus provocans Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.
Culicada nemorosa Theobald (in part), Mon. Culic., iv, 370, 1907.
Culicada nemorosa Theobald (in part), Mon. Culic., v, 307, 1910.

ORIGINAL DESCRIPTION OF CULEX PROVOCANS:

Mas.: *Rufo-fuscus, capite thorace abdominisque fasciis albo hirtis, antennis fuscis, pedibus obscuré rufis, alis limpidis.*

Body reddish brown, clothed with white hairs, which are most thick on the head and on the chest: feelers and mouth brown: abdomen with a broad white band of hairs at the base of each segment: legs dull red: wings colourless; veins pale brown; poisers yellow, with brown knobs. Length of the body 2½ lines; of the wings 5 lines.

a. North America.

b. Nova Scotia. From Lieut. Redman's collection.

ORIGINAL DESCRIPTION OF CULEX PROVOCANS, FEMALE (DOUBTFULLY ASSOCIATED):

Rufo-fuscus, capite thorace abdominisque fasciis flavo hirtis, antennis pedibusque nigro-fuscis, femoribus flavis, alis limpidis.

Body reddish brown: head and chest clothed with yellow hairs: feelers and mouth very dark brown: abdomen with a band of yellow hairs at the fore border of each segment: legs dark brown; thighs yellow, with brown tips: wings colourless; veins brown. Length of the body 2½ lines; of the wings 5 lines.

a. Nova Scotia. From Lieut. Redman's collection.

DESCRIPTION OF FEMALE OF AËDES PROVOCANS (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather long, subcylindrical, uniform; labellæ conically tapered; vestiture black, somewhat paler beneath; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth as long as the proboscis, black; setæ moderate, bristly. Antennæ filiform, the joints subequal, rugose, pilose, black; second joint longer than third, thickened, luteous, dark at tip; tori subspherical, with a cup-shaped apical excavation, luteous, with some small creamy scales, a few similar scales on the second joint; hairs of whorls moderate, sparse, black. Clypeus broadly rounded triangular, prominent, black, nude. Eyes black. Occiput black, the scales on vertex narrow, curved, pale yellowish, on sides broad, creamy white; erect forked scales on nape whitish, a few blackish ones towards sides; bristles along margins of eyes black, those projecting between the eyes pale.

Prothoracic lobes elliptical, remote dorsally, black, clothed with narrow whitish scales and brown bristles. Mesonotum deep brown, clothed with narrow curved scales, those towards sides coarse, a median stripe of reddish-brown ones occupying less than one-third the width of the disk, scales on sides pale golden brown, becoming creamy at margins and around the antescutellar space. Scutellum trilobate, brown, clothed with narrow curved creamy-white scales, each lobe with a group of brown bristles. Postnotum elliptical, prominent, brownish, nude. Pleuræ brown, coxæ luteous, with rows of pale bristles, clothed with patches of elliptical, flat white scales, those at upper anterior angles narrow, curved, pale golden brown.

Abdomen subcylindrical, tapering posteriorly; dorsal vestiture dull black, with rather broad, white, basal, segmental bands, which widen to form triangular patches on the sides; venter whitish-scaled, with a median longitudinal line of dark scales and indications of dark apical segmental bands. Cerci black.

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Wings rather broad, hyaline, slightly infuscated; petiole of second marginal cell shorter than its cell, that of second posterior cell about the same length as its cell; basal cross-vein a little less than its own length distant from anterior cross-vein; scales dusky, those on costal margin black, the outstanding ones broadly linear. Halteres whitish, with dark knobs.

Legs moderately long and slender; femora whitish scaled below, with black ones above and a black ring before tip; knees white; tibiæ largely pale-scaled below, bronzy-brown above, tips black; tarsi black with a bronzy luster, somewhat paler beneath. Claw formula, 1.1–1.1–1.1.

Length: Body about 4 mm.; wing 4.3 mm.

Life history and habits unknown.

Nova Scotia, New Brunswick, and Labrador, Canada.

Younghall, New Brunswick, July 2, 1908 (A. Gibson); July 6, 1908 (J. Fletcher); Cape Charles, Labrador, July 28, 1906 (C. W. Johnson); St. Lewis Inlet, Labrador, July 12, 1906 (C. W. Johnson); Rigolet, Labrador, July 18, 1906 (C. W. Johnson). Also reported from Nova Scotia (Walker).

Walker described *Aëdes provocans* from Nova Scotia. We have no specimens from that locality, nor have we had an opportunity to study Walker's types; but we venture to identify the present specimens with this species rather than to describe them under a new name.

AËDES AUROIDES (Felt) Dyar & Knab.

Culicelsa auroides Felt, Bull. 97, N. Y. State Mus., 448, 449, 1905.
Culicelsa auroides Dyar, Journ. N. Y. Ent. Soc., xiv, 109, 1906.
Aëdes auroides Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 197, 1906.
Ochlerotatus auroides Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.
Ochlerotatus auroides Dyar, U. S. Dept. Agr., Bur. Ent., Circ. 72, 5, 1906.
Culiselsa auroides Theobald, Mon. Culic., iv, 380, 1907.
Culicelsa auroides Theobald, Mon. Culic., v, 322, 1910.

ORIGINAL DESCRIPTION OF CULICELSA AUROIDES:

Several larvæ of this species were taken at Elizabethtown, N. Y., and were at first supposed to be the young of C. aurifer Coq. A close study, however, showed marked structural differences between the two in the larval stage, though the adults present a very similar appearance. It is therefore described as a new form.

Female. Proboscis dark brown, about two thirds the length of the body. Palpi short, dark brown, third segment about one third the length of the stout uniform fourth segment; fifth rudimentary. Antennæ a little shorter than the proboscis. Basal segment yellowish brown, fuscous internally and with an inconspicuous patch of whitish scales dorsally and internally; other segments dark brown with medium basal whorls and thinly clothed with short golden setæ. Occiput thickly clothed with curved, golden yellow scales and with numerous erect, golden yellow, fork scales posteriorly. Mesonotum with a conspicuous median stripe of rich brown scales, becoming yellowish, thinner and obsolete posteriorly. A short, sublateral line of the same color occurs on the posterior third; other portions of mesonotum rather thickly clothed with golden yellow scales. Pleura thickly clothed with silvery white scales. Scutellum rather thickly clothed with long, golden yellow scales and with a conspicuous median and smaller lateral apical groups of long, golden yellow setæ; postscutellum smooth, dark brown. Halteres, apical portion slightly fuscous, basal semitransparent, whitish. Abdomen dark brown with distinct basal yellowish white bands, slightly prolonged laterally. Terminal lobes fuscous. Ventral surface suffused with yellowish white scales. Coxæ brownish yellow, rather thickly clothed with whitish scales; legs brown, unbanded. Femora and tibiæ yellowish white ventrally; tarsi dark brown, tarsal claws unidentate. Wings with costa and first longitudinal vein thickly clothed with purple brown scales, subcosta and other veins more sparsely ornamented; fringe a purplish gray. Petiole of first submarginal cell about two thirds the length of the cell; that of the second nearly as long as its cell. Posterior cross vein a little over its own length from the mid cross vein.

Described from a freshly bred, isolated specimen obtained May 12 in the larval stage at Elizabethtown N. Y. The larva presents some marked differences, particularly in the shape of the antennæ at least, from that of the typical aurifer received from Mr. Brakeley of Hornerstown N. J.

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Larva about ⅜ inch long. Antenna brown, slightly fuscous apically, stout, slightly swollen at the base, gently curved and tapering gradually to a somewhat blunt apex. Tuft at the basal third consisting of about four apparently simple hairs. Tip with one long segmented apical process, a shorter, much more slender one, a stout, long process and a considerably stouter, short one. Surface, specially apically, ornamented with rather large, stout, somewhat isolated, chitinous spines. Labial plate broadly triangular with about 25 rather fine teeth. Comb consisting of a somewhat triangular patch of about 16 scales, each with a spatulate, enlarged base, coarsely and rather sparsely setose on the sides and with a stout subapical and a rather long apical spine, the latter as long or longer than the body of the scale. Air tube stout, about three times as long as broad, slightly swollen at the basal third and tapering gradually to the tip. Pecten consisting of two rows of closely set, stout, dentate spines, 20 to 24 in each, with a compound hair just beyond the tip of each and at about the middle of the air tube, each tooth usually with one large and two or three smaller denticulations, basal portion about one half the length of the longer terminal spine. Chitinous ring of ninth segment about two thirds as long as broad, inclosing the entire segment, barred area short. Dorsally there is a long, simple caudal seta.

This larva presents a striking resemblance to that of the typical C. aurifer larvæ from New Jersey. A close examination, however, shows that marked differences are presented by the antennæ, the tuft being at the basal third in this form instead of beyond the middle, as in the true aurifer. There are more teeth in the labial plate and an examination of the comb scales reveals a considerable difference between the lateral serrations at the base which, in this form, have the two subapical teeth on either side of the central spine considerably stouter than the preceding ones, whereas in the true aurifer there is no such marked difference. The teeth of the pecten are more closely set and in aurifer the base of each pecten tooth is a little stouter and usually possesses more serrations. The chitinous ring of the ninth segment incloses the segment in this form and does not in aurifer.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES AUROIDES:

Female.—Proboscis moderately long, subcylindrical, uniform; labellæ conically tapered; vestiture black; setæ on labellæ minute, curved, black, outstanding. Palpi short, less than one-fifth as long as proboscis, black; setæ moderate, bristly. Antennæ filiform, the joints subequal, rugose, pilose, black; second joint longer than third, slightly thickened and paler at base; tori subspherical, with a cup-shaped apical excavation, luteous, darker and with a patch of whitish scales on inner side; hairs of whorls moderate, sparse, black. Clypeus rounded triangular, prominent, black, nude. Eyes black. Occiput black, scales on vertex narrow, broad on sides, light golden yellow, a little paler laterally; many short, erect forked pale scales on the nape; bristles along margins of eyes black, those projecting between the eyes pale.

Prothoracic lobes elliptical, remote dorsally, black, clothed with narrowly and broadly lanceolate yellowish-white scales and brown bristles. Mesonotum black, clothed with narrow curved scales, a distinct straight stripe medianly of smaller bronzy-brown scales which does not reach antescutellar space, sides pale golden yellow, with more or less of a brown tint, paler at anterior angles and posteriorly; bristles around the antescutellar space and over roots of wings golden yellow. Scutellum trilobate, black, clothed with narrow, curved, pale-golden yellow scales and each lobe with golden yellow bristles. Postnotum elliptical, prominent, blackish, nude. Pleuræ black, coxæ luteous, with rows of pale bristles; clothed with patches of elliptical, flat white scales, prothoracic epimera clothed with narrow, curved brown scales.

Abdomen subcylindrical, tapering posteriorly; dorsal vestiture black, with rather narrow, white, basal segmental bands which are narrow or obsolete centrally and widen to triangular patches on the sides; first segment with whitish scales and many fine pale hairs; venter whitish scaled, with the tips of the segments centrally black marked; cerci black.

Wings moderate, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell about the same length as its cell; basal cross-vein distant about its own length from anterior cross-vein; scales blackish brown, the outstanding ones broadly linear. Halteres whitish, with darker knobs.

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Legs moderately long and slender; femora yellowish-white scaled below, with black scales above and a black ring before the tip; knees white-scaled; tibiæ largely white-scaled below, black above, tips of hinder pair black; tarsi black scaled, the basal joint beneath with white scales, becoming fewer outwardly, the terminal joints entirely black. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis long and slender, straight, black scaled. Palpi exceeding the proboscis by the length of the last joint; end of long joint and last two joints somewhat swollen and with dense long hairs, black with brownish luster; vestiture black. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, blackish; hairs of whorls long, dense, brownish-black. Coloration similar to the female, the sides of the mesonotum paler, of a whitish golden yellow without any brown tint. Abdomen elongate, depressed, the segmental white bands broader and more produced at the sides; lateral ciliation of long and abundant fine pale hairs. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture less abundant. Claw formula, 1.1–1.1–1.1.

Length: Body about 5 mm.; wing 4 mm.

Genitalia (plate 26, fig. 177): Side-pieces more than twice as long as wide; apical lobe well developed, prominent, continued narrowly along the side-piece; basal lobe prominent, roundedly quadrate, densely setose and with a stout seta near its base. Clasp-filament slender, moderate, nearly uniform, notched towards apex and bearing a few fine setæ, a long articulated terminal spine. Harpagones with a moderately long columnar base, its basal portion somewhat thicker than the outer portion, minutely setose inwardly, bearing a rather small terminal filament, elliptical, with attenuated pointed tip. Harpes elliptical, concave, curved, inner margin thickened and revolute, tip pointed and curved outward. Unci approximate, revolute, forming a small basal cylinder. Basal appendages remote, bearing four or five stout terminal setæ.

Larva, Stage IV (plate 123, fig. 427).—Antennæ cylindrical, slightly curved, rather sparsely spined; a moderate tuft just beyond basal third; a long spine, two short ones, and a digit at tip. Dorsal head-hairs in twos, ante-antennal tufts four-haired. Mental plate triangular, with a central tooth and thirteen on each side, the basal ones more remote and pointed, the last small. Mandible quadrangular, with slight dentitions on outer margin; two filaments from a notch before tip; an outer row of cilia from a collar; a row of filaments on outer margin; dentition of four teeth on a process, the first and third long; a spine before, two small teeth at base, a flat filament and five curved feathered hairs within; process below broad and thick, widely furcate, with four hair patches; basal angle prominent, with a row of long hairs within; a row of long hairs at base. Maxilla shortly conical, divided by a band-shaped suture; inner half with lower part prominent, angularly inflected in the middle; a marginal and submarginal row of cilia and a patch within near the suture, a tuft of long hairs at tip; outer half with a band of hairs and two long articulated filaments next the suture; palpus short and stout, with four small terminal digits and a central prominence. Air-tube tapered, about three times as long as wide; pecten teeth evenly spaced, not reaching the middle, followed at about the middle by a single tuft of about four hairs; single pecten-tooth a stout spine with three teeth on basal half. Lateral comb of eighth segment of about fourteen scales in a triangular patch; single scale drawn out into a long stout thorn, sides with a few small spinules. Anal segment longer than broad, ringed by the plate; dorsal tuft a brush and hair on each side; a lateral hair; ventral brush well developed, confined to the barred area; anal gills well developed, longer than anal segment, tapered to a point.

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Aëdes auroides is one of the early spring species. Dr. Felt bred his only specimen from larvæ taken with the other early species, while Mr. Busck found the larvæ commonly associated with the other spring forms.

Northern New York to New Hampshire.

Dublin, New Hampshire, May and June, 1909 (A. Busck). Also reported from Elizabethtown, New York (Felt).

Aëdes auroides is readily distinguished by the male genitalia or the larvæ. Well-marked females can be told by the thoracic ornamentation, but this is subject to considerable variation, the brown mesial stripe becoming faint, or the lateral coloration darkened, or both. We have felt obliged to use the characters of the thoracic ornamentation to separate the species of this group in our tables, because we know of no other characters, but it should be kept in mind that they are variable and no absolute reliance should be placed upon them.

It is probable that this species has a wider distribution than here given and it may be the same as *Aëdes provocans* Walker, which we recognize from more northerly localities. We can not, however, decide this point with our present material.

AËDES ABSERRATUS (Felt & Young) Morse.

Culex abserratus Felt & Young, Science, n. s., xx, 312, 1904.
Culex punctor Dyar (not Kirby), Proc. Ent. Soc. Wash., vi, 39, 1904.
Culex punctor Dyar (not Kirby), Journ. N. Y. Ent. Soc., xii, 169, 245, 1904.
Culex punctor Coquillett (not Kirby), Proc. Ent. Soc. Wash., vi, 168, 1904.
Culex abserratus Felt, Bull. 79, N. Y. State Mus., 329, 1904.
Culicada abserratus Felt, Bull. 79, N. Y. State Mus., 391*c*, 1904.
Grabhamia punctor Dyar (not Kirby), Journ. N. Y. Ent. Soc., xiii, 186, 1905.
Culicada abserratus Felt, Bull. 97, N. Y. State Mus., 467, 1905.
Aëdes punctor Dyar & Knab (not Kirby), Journ. N. Y. Ent. Soc., xiv, 194, 1906.
Ochlerotatus punctor Dyar (not Kirby), U. S. Dept. Agr., Bur. Ent., Circ. 72, 4, 1906.
Ochlerotatus abserratus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 19, 1906.
Culicada abserrata Theobald, Mon. Culic., iv, 364, 1907.
Culicada abserrata Theobald, Mon. Culic., v, 306, 1910.
Culicada punctor Theobald (in part, not Kirby), Mon. Culic., v, 309, 1910.
Aëdes abserratus Morse, Ann. Rept. N. J. State Mus., 1909, 719, 1910.

ORIGINAL DESCRIPTION OF CULEX ABSERRATUS:

Another very interesting larva was met with June 14 in a cold mountain pool at Elizabethtown, N. Y., and may be easily recognized by the comb consisting of but six to seven thorn-like scales arranged in a curved line, with a large, finely setose, spatulate base and with a stout, apical spine. The air tube is about three times as long as wide, tapering regularly and with double posterior pecten on the basal third, each row consisting of twelve to fifteen closely set, stout spines, each bearing near the basal third one large and usually a smaller tooth. This larva produced an adult, *Culex abserratus* n. sp., which resembles *C. impiger* very closely and may be separated therefrom by the posterior cross vein being its own length or more from the mid cross vein, the thorax spotless, basal abdominal bands distinct, and the petiole of the first submarginal cell one half the length of the cell.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES ABSERRATUS:

Female.—Proboscis rather long, subcylindrical, uniform; labellæ conically tapered; vestiture black; setæ on the labellæ minute, outstanding. Palpi short, about one-fifth as long as the proboscis, black, the setæ moderate, bristly. Antennæ filiform, the joints subequal, rugose, pilose, black, second joint slightly thickened and paler; tori subspherical, with a cup-shaped excavation, luteous brown, some white scales on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, prominent, black, nude. Eyes black. Occiput black, scales on vertex narrow, on the sides broad, yellowish-white on vertex, with some golden-brown scales each side of middle line, dull white on the sides, and an ill-defined lateral black patch, many short, erect, forked pale scales on nape; bristles along margins of eyes black, those projecting between the eyes pale.

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Prothoracic lobes elliptical, remote dorsally, black, clothed with narrow golden-brown scales and dark bristles. Mesonotum black, evenly clothed with narrow, curved scales, bright bronzy brown, an indistinct, slightly darker median stripe of smaller scales, scales over antescutellar space yellowish white. Scutellum trilobate, black, clothed with narrow, curved, yellowish-white scales, each lobe with a group of pale bristles. Postnotum elliptical, prominent, blackish, nude. Pleuræ brown, coxæ luteous, with rows of pale bristles; clothed with patches of elliptical flat white scales, the prothoracic epimera with narrow curved bronzy brown scales like those on mesonotum.

Abdomen subcylindrical, tapering posteriorly; dorsal vestiture black, with moderate, white, basal segmental bands, broader posteriorly, which widen to triangular patches on the sides; first segment with white scales and numerous fine pale hairs; venter whitish scaled, the last two or three segments with black, apical lateral patches. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell about the same length as its cell; basal cross-vein distant about its own length from anterior cross-vein; scales dull brown, the outstanding ones broadly linear. Halteres whitish, knobs dark.

Legs moderate; femora yellowish-white scaled below with black ones above and a black ring before tip; knees white; tibiæ largely pale scaled below, black above, tips black; tarsi black scaled, the basal joint with many pale scales beneath becoming fewer outwardly, terminal joints entirely black. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis long and slender, straight, black scaled. Palpi nearly as long as proboscis, blunt at tip; end of long joint and last two joints somewhat swollen; vestiture black; hairs on the end of long joint and on last two joints long, dense, black with a yellowish reflection in certain lights. Antennæ plumose, the last two joints long and slender, pilose, the others short, blackish; hairs of whorls long, dense, brownish black with yellow luster. Coloration similar to the female. Wings narrower than in the female, stems of the fork-cells longer, vestiture less abundant. Abdomen elongate, depressed, with dense, long and pale lateral ciliation; dorsal white segmental bands broader and more expanded laterally than in the female, last segment entirely white-scaled. Claw formula, 1.1–1.1–1.1.

Length: Body about 5 mm.; wing 4 mm.

Genitalia (plate 29, fig. 195): Side-pieces more than twice as long as wide; apical lobe well developed, prominent, continued narrowly along side-piece to basal lobe, which is slightly squarely prominent and bears numerous setæ with tubercular bases and a stout hooked spine with an attendant group of smaller spines. Clasp-filament slender, moderate, slightly expanded in middle, notched towards apex, and bearing a few fine setæ, a long articulated terminal spine. Harpagones with a moderate, slender, columnar base bearing a rather short, articulated, medianly widened, terminal filament. Harpes elliptical, concave, curved, inner margin thickened and revolute, tip pointed and curved outward. Unci approximate, revolute, forming a small basal cylinder. Basal appendages approximate, bearing four or five stout terminal setæ.

Larva, Stage IV (plate 124, fig. 431).—Head rounded, narrowed before eyes, a slight notch at insertion of antennæ, front margin arcuate. Antennæ cylindrical, curved, spined all over; tuft moderate, before middle; four terminal spines of various lengths, two shortly subapical, a short thick digit. Eyes transverse, pointed. Dorsal head-hairs single, ante-antennal tufts in threes or fours. Mental plate shortly triangular; apical tooth broad, roundedly incised as if formed of three fused teeth, eleven side-teeth becoming larger basally, the last one small and remote. Mandible quadrangular, with small spines near base;

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two filaments before tip; an outer row of cilia from a collar; eleven filaments on outer edge; dentition of four teeth on a process, the first longest; a filament and two unequal teeth before; a broad filament and six feathered ones within, unusually large; process below furcate, with patches of hair; a pointed basal angle, with four long hairs within; a long row of hairs at base. Maxilla elongate hemispherical, divided by an oblique suture; inner half with rows of hairs, a large tuft at vertex; outer half with a band of hair, two filaments next the suture toward apex and a spine on the other side; palpus short, with four small digits and a central elevation. Thorax wider than long; hairs moderate. Abdomen rather stout, the anterior segments shorter; lateral hairs single on segments 3 to 6; tracheal tubes broad, band-shaped. Air-tube stout, about three times as long as wide; pecten usually evenly spaced, occasionally with some of the terminal teeth somewhat detached, reaching less than half the length of tube, followed by a single tuft of two or three hairs; single spine long, slightly widened at base, with two small branches rather far out. Lateral comb of eighth segment of a very few scales in a line; single scale elliptical, fringed with short spinules and with one very long stout terminal spinule. Anal segment longer than wide, ringed by the plate; dorsal tuft a pair of long hairs on each side; ventral brush well developed, confined by the plate; anal gills moderate, tapered.

The larvæ appear in the early spring, hatching from the overwintering eggs. There is but a single annual generation. The larvæ occur mixed with the other early spring species in woodland pools and marshes, often when ice is still present. Mr. Knab and Dr. Dyar collected nearly fully-grown larvæ from a marsh by standing upon ice at its edges and dipping under the ice, where the larvæ had taken refuge. The females live for two or three months in the woods, and soon become much worn, being then indistinguishable from other species of *Aëdes* with similar habits.

Northeastern United States, probably also in Canada.

Plattsburg, New York, larvæ April 24, 1905 (H. G. Dyar); Dublin, New Hampshire, May, June, 1909 (A. Busck); Springfield, Massachusetts, April 28, 1903 (F. Knab); Wilbraham, Massachusetts, June 4, 1903 (F. Knab); Mount Tom, Massachusetts, May 6, 1903 (F. Knab). Reported also from Orange Mountains and New Brunswick, New Jersey (Morse).

It seems probable that *Aëdes abserratus* has a wider range than indicated by our localities. Its distribution seems northern, and it is probably due to chance only that no specimens have appeared in our collections from Canada. This species has been referred to by several American authors under the name *punctor*.

AËDES PUNCTOR (Kirby).

Culex punctor Kirby, Richardson's Fauna Bor.-Amer., iv, 309, 1837.
Culex punctor Bethune, Can. Ent., xiii, 164, 1881.
Culex punctor Giles, Handb. Gnats or Mosq., 289, 1900.
Culex punctor Theobald, Mon. Culic., ii, 75, 86, 1901.
Culex punctor Giles, Handb. Gnats or Mosq., 2 ed., 435, 1902.
Culex punctor Blanchard, Les Moustiques, 359, 1905.
Culicada punctor Theobald, Mon. Culic., iv, 371, 1907.
Culicada punctor Theobald (in part), Mon. Culic., v, 309, 1910.

ORIGINAL DESCRIPTION OF CULEX PUNCTOR:

C. (Punctor) nigra; pedibus, alarumque, albarum neuris, testaceis.
Pungent Culex, black with the legs, and nervures of the white wings, testaceous.
Length of the body 3½ lines.
Two specimens taken in Lat. 65°.
Body black. Proboscis longer than the trunk; sheath black; valvules and lancets testaceous; palpi somewhat incrassated towards the apex; antennæ broken off in both specimens; wings white, iridescent, with testaceous nervures, without scales, hairs, and fringe: legs testaceous.

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St. Martin's Falls, Albany River, British America (Kirby).

Unknown to us. Giles states that the types are two males in fair preservation. He describes the mesonotum as "dark red brown, with five lines of brilliant white tomentum, viz., a fine median; two complete broad lateral, and external to these again a narrow pair of lateral lines incomplete in the middle." Theobald states that the types are two males and one female and describes the ornamentation of the mesonotum as follows:

Thorax deep brown, covered at the sides with narrow creamy curved scales, which form a line on each side passing back to the scutellum; between these two lines the mesonotum is covered with deep bright chestnut-brown, narrow curved scales, there being a narrow median double line of pale scales in the middle separated by a distinct dark bare line; the pale scales of the median lines spread out round the bare patch in front of the scutellum and form a pale patch; there are three rows of dark bristles which become paler posteriorly; the sides of the mesonotum are deep black, with scanty creamy scales.

We do not feel safe to identify this species in any of the material before us. The name was applied by Coquillett to a mixture of species, hence its application by American authors to several species. We can not consider the introduction of the name *punctor* in this manner as a restriction and it will be found in the proper places in the synonymy.

AËDES IMPIGER (Walker) Dyar & Knab.

Culex impiger Walker, List Dipt. Brit. Mus., i, 6, 1848.
Culex implacabilis Walker, List Dipt. Brit. Mus., i, 7, 1848.
Culex impiger Giles, Handb. Gnats or Mosq., 323, 1900.
Culex nigripes var. *impiger* Theobald, Mon. Culic., ii, 39, 1901.
Culex nigripes Theobald (in part, not Zetterstedt), Mon. Culic., ii, 93, 1901.
Culex nigripes Giles (in part, not Zetterstedt), Handb. Gnats or Mosq., 2 ed., 444, 1902.
Culex nigripes Theobald (in part, not Zetterstedt), Mon. Culic., iii, 193, 1903.
Culex impiger Felt, Bull. 79, N. Y. State Mus., 316, 1904.
Culicada impiger Felt, Bull. 79, N. Y. State Mus., 391*b*, 1904.
Culex impiger Dyar, Journ. N. Y. Ent. Soc., xiii, 27, 1905.
Culex nigripes Blanchard (in part, not Zetterstedt), Les Moustiques, 345, 1905.
Grabhamia impiger Dyar, Proc. Ent. Soc. Wash., vii, 48, 1905.
Culicada impiger Felt, Bull. 97, N. Y. State Mus., 447, 478, 1905.
Aëdes impiger Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 193, 1906.
Ochlerotatus impiger Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 19, 1906.
Ochlerotatus impiger Dyar, U. S. Dept. Agr., Bur. Ent., Circ. 72, 4, 1906.
Culicada nigripes Theobald (in part, not Zetterstedt), Mon. Culic., 311, 1910.

ORIGINAL DESCRIPTION OF CULEX IMPIGER:

Fem. *Niger, capite thoraceque flavo hirtis, thoracis lateribus albo hirtis, abdominis segmentis supra albo fasciatis subtus albis aut flavis, pedibus obscuré flavis, femoribus tibiisque apice tarsisque nigris, alis limpidis.*

Body black: head and chest clothed with yellow hairs: sides of the chest clothed with white hairs: abdomen white or yellow beneath, and having on its back a band of white hairs at the fore border of each segment: legs very dingy yellow; feet, and tips of the thighs and of the shanks, black: wings colourless; veins brown; poisers yellow, with brown knobs. Length of the body 2 lines; of the wings 4 lines.

a. St. Martin's Falls, Albany River, Hudson's Bay. Presented by G. Barnston, Esq.

ORIGINAL DESCRIPTION OF CULEX IMPLACABILIS:

Fem. *Niger, capite thorace abdominisque fasciis flavo hirtis, pedibus flavis, femoribus apice nigris, genubus albis, tarsis et metatibiis fuscis, alis limpidis.*

Body black: head and chest thickly clothed with yellow hairs: abdomen with a band of yellow hairs at the fore border of each segment: legs dull yellow; tips of the thighs black; knees dull white; feet and hind shanks dark brown: wings colourless; veins brown; poisers dull white, with brown tips. Length of the body 2 lines; of the wings 4 lines.

a. St. Martin's Falls, Albany River, Hudson's Bay. Presented by G. Barnston, Esq.

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DESCRIPTION OF FEMALE, MALE, AND LARVA OF ALEDES DIPTERUS:

Female.—Proboscis moderately long, subcylindrical, uniform; labellæ conically tapered; vestiture black with slight bronzy luster; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, less than one-fifth as long as proboscis; vestiture black with some white scales intermixed; setæ moderate, bristly, black. Antennæ filiform, the joints subequal, rugose, pilose; second joint somewhat enlarged, brown, pale at base; tori subspherical, with a cup-shaped apical excavation, luteous brown, with a patch of small brown setæ on inner side; hairs of whorls moderate, sparse, black. Clypeus roundedly triangular, prominent, nude, black. Eyes black. Occiput black, with narrow, curved, pale-ocherous scales on vertex, broad, flat, dull whitish ones on the sides; many short, erect, forked yellowish scales on the nape; setæ along margins of eyes black, those projecting forward between the eyes pale.

Prothoracic lobes elliptical, remote dorsally, black, clothed with narrow curved yellowish-white scales and black bristles. Mesonotum black, clothed with narrow, curved, pale bronzy-brown scales which are divided medianly by two longitudinal narrow stripes in which the ground-color prevails and the scales are smaller and slightly darker; scales surrounding antescutellar space lighter; bristles numerous, moderate, black. Scutellum trilobate, black, clothed with pale ocherous scales, each lobe with a group of pale bristles. Postnotum elliptical, prominent, brown, slightly pruinose. Pleuræ brown, coxæ luteous, clothed with narrow golden-brown scales above, elliptical, flat, white ones below, and with rows of pale bristles.

Abdomen subcylindrical, flattened, tapering posteriorly; dorsal vestiture of black scales, each segment with a rather broad basal white band which widens somewhat laterally; first segment with dull white scales and with many long pale hairs; venter largely sordid white scaled. Cerci black.

Wings rather long, hyaline; petiole of second marginal cell a little shorter than its cell, that of second posterior cell about equal to its cell; basal cross-vein about its own length distant from anterior cross-vein; scales blackish brown, outstanding scales broadly linear. Halteres pale, with whitish knobs.

Legs moderately long and slender; femora largely black scaled above, yellowish-white below, a black ring close to apex; knees white; tibiæ with dull yellowish-white and brownish-black scales intermixed, the pale scales predominating on under sides; tarsi brownish black scaled, the first joint largely pale scaled beneath, the black scales increasing outwardly, terminal joints wholly black. Claw formula, 1.1–1.1–1.1.

Length: Body about 5.5 mm.; wing 5 mm.

Male.—Proboscis long, slender, straight, black. Palpi exceeding the proboscis by about the length of the last joint; vestiture of dull bronzy-black scales; end of long joint and last two joints slightly enlarged, with abundant, long black hairs. Antennæ plumose, the last two joints long, slender, rugose, pilose, black, the others short, brown, with black rings; hairs of whorls very long, brown with silky luster. Coloration similar to the female. Abdomen elongate, depressed, the segmental white bands broader than in the female; lateral ciliation long, fine and abundant, pale brownish. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture sparse. Claw formula, 1.1–1.1–1.1.

Length: Body about 6 mm.; wing 5 mm.

Genitalia (plate 24, fig. 168): Side-pieces nearly three times as long as wide, rounded at tip; apical lobe roundedly prominent, without basal continuation; basal lobe digitate, appressed, with a side-piece bearing two stout apical setæ. Clasp-filament long, swollen in middle, with four small setæ towards tip, a long articulated terminal spine. Harpes elliptical, concave, inner margin thickened

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and revolute, tip pointed and outcurved. Harpagones with a very long stem, its basal and larger portion thick, terminating in a rounded setose knob, apical portion slender, bearing a large terminal filament which is angularly widened in middle, the crest of angulation sharply pointed, slightly recurved. Unci approximated, revolute, forming a thick basal cylinder with a double-pointed tip. Basal appendages approximate, bearing several short stout setæ.

Larva, Stage IV (see figure of the entire larva, plate 73).—Head broad, rounded, narrowing slightly before eyes, a slight notch at insertion of antennæ, front margin broadly arcuate. Antennæ rather long, slightly tapered, densely spined all over with large and small spines; tuft small, a little before the middle; four short terminal thick spines and one long one. Eyes large, transverse, pointed. Both pairs of dorsal tufts and the ante-antennal tuft multiple. Mental plate broadly triangular, a central tooth and fourteen on each side, becoming larger and more remote basally. Mandible quadrangular, a few spines at base; two long filaments toward tip; a row of long cilia outwardly from a collar; four filaments and four very slender ones on outer margin; dentition of four teeth on a process, the first longest; a filamentous process before, two little teeth at base, a broad filament and four serrate hairs within; four little hairs below; process cleft-furcate, with tufts of hair; a long angle below; five filamentous hairs within; a row of long hairs at base. Maxilla conical, divided by a suture; inner half hairy, a long brush at tip; outer half with some hair, two filaments near the suture, two spines on the other side; palpus short, four small terminal digits, one of them short. Thorax rounded, transverse; hairs rather short and sparse, the subdorsal prothoracic hairs a very small tuft followed by a single long hair. Abdomen rather long, the anterior segments somewhat shorter; hairs sparse, the laterals of first segment double, the rest single and progressively shorter posteriorly; secondary hairs very small; tracheal tubes broad, band-shaped, slightly expanded in the segments, even and regular. Air-tube stout, tapered, thickest beyond base, about three times as long as wide; pecten reaching to near middle, the last two or three teeth detached, remote; a single large tuft beyond pecten. Lateral comb of eighth segment of few scales in a partly double row; single scales with pointed base, the body elliptical and fringed with short spines, the tip a single long, smooth stout spine. Anal segment longer than wide; dorsal plate reaching very near the ventral line, deeply incised posteriorly; dorsal tuft a brush and rather short hair on either side; ventral brush well developed, with short tufts preceding barred area toward base; anal gills moderate, ensiform, not very sharply pointed.

The larvæ develop in the early spring pools formed by the melted snow, hatching from overwintering eggs. There is but a single generation in the year. The habits, so far as known, are the same as those of the other early spring species with which they occur, the adults flying in the woods till midsummer.

Northeastern United States and Canada.

West Springfield, Massachusetts, April 13, 1905 (Dyar and Knab); Longmeadow, Massachusetts, April 16, 1905 (Dyar and Knab); Cobble Hill, Elizabethtown, New York, larvæ April 23, 1905 (H. G. Dyar); Karner, New York, March 19, 1904 (E. P. Felt); Ottawa, Ontario (J. Fletcher); Chats Rapids, Quebec, May 24, 1900 (J. Fletcher); White River, Ontario, June 24, 1907 (F. Knab).

We accept Felt's identification of Walker's names as a definite restriction which should be followed, Walker's types being unrecognizable in this group. The European *Aëdes nigripes* (Zetterstedt) has not been critically studied and its relation to our species is therefore unknown.

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AËDES DIANTÆUS, new species.

DESCRIPTION OF MALE OF AËDES DIANTÆUS (FEMALE AND LARVA UNKNOWN):

Male.—Proboscis long, slender, straight, black. Palpi slightly exceeding the proboscis in length, blunt at apices; vestiture brownish-black; end of long joint and last two joints slightly enlarged, with dense, moderately long, black hairs. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, pale, with blackish rings; hairs of whorls long, black with brown silky luster. Occiput black, clothed with narrow, curved, creamy-yellow scales above, the sides with broad, flat, dull white scales; nape with many short, upright, forked, creamy-yellow scales; a row of long black bristles along margins of eyes, those projecting forward between eyes pale yellow.

Prothoracic lobes elliptical, remote dorsally, brownish, clothed with narrow curved, creamy-yellow scales and with a few black bristles. Mesonotum clothed with rather coarse, narrow, curved, creamy-yellow scales and with two narrow submedian lines of brownish-black scales which are smaller and denser. (Scutellum and posterior portion of mesonotum denuded.) Postnotum nude, deep brown. Pleuræ deep brown, coxæ luteous; clothed with flat white scales, the prothoracic epimera with narrow, curved, creamy-yellow scales.

Abdomen elongate, depressed; dorsal vestiture black, with narrow, whitish, basal segmental bands, obsolete centrally; venter whitish scaled, the segments with apical, median black spots; lateral ciliation moderately long and abundant, brownish-yellow.

Wings narrow, hyaline; stems of second marginal and second posterior cells longer than their cells; basal cross-vein more than its own length from anterior cross-vein; vestiture sooty brown with a few pale scales intermixed, rather sparse; outstanding scales linear.

Legs rather long and slender; vestiture sooty brown, the femora pale beneath to near apices; knees pale scaled; tarsi entirely dark scaled. Claw formula, 1.1–1.1–1.1.

Length: Body about 6 mm.; wing 5 mm.

Genitalia (plate 24, fig. 167): Side-pieces nearly three times as long as wide, rounded at tip; apical lobe roundedly prominent, without basal prolongation; basal lobe digitate, appressed, with a side-piece bearing two stout apical setæ. A group of dense hairs arising at origin of apical lobe. Clasp-filament long, slender, with two small setæ towards tip arising from slight notches; a long articulated terminal spine. Harpes elliptical, concave, inner margin thickened and revolute, tip pointed and outcurved. Harpagones with a long stem, its basal and larger portion thick, angular and bearing a few setæ, apical portion slender, with a broad terminal filament which is expanded at tip, the angles of the expansion pointed, the termen emarginate. Unci approximated, revolute, forming a basal cylinder. Basal appendages approximate, bearing several short, stout setæ.

Type: No. 12678, U. S. Nat. Mus.

The larvæ develop in the early spring pools left by the melted snow, hatching from overwintering eggs. There is but a single generation in the year. The habits, so far as known, are the same as those of the other early spring species, with which they occur, the adults flying in the woods till midsummer.

New Hampshire.

Dublin, May and June, 1909 (A. Busck).

The present species is clearly distinct by the male genitalia, which are allied to those of *Aëdes impiger*, yet markedly different. Two males before us show these characters, and have been made the types of the species, yet unfortunately they are so badly preserved, that it is nearly impossible to determine their markings and coloration. For this reason we are not able to positively identify any female specimens as belonging here.

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AËDES TRICHURUS (Dyar) Dyar & Knab.

Culex punctor Dyar (in part, not Kirby), Proc. Ent. Soc. Wash., vi, 39, 1904.
Culex impiger (no. 2) Dyar & Knab (not Walker), Proc. Ent. Soc. Wash., vi, 144, 1904.
Culex trichurus Dyar, Journ. N. Y. Ent. Soc., xii, 170, 244, 1904.
Culex cinereoborealis Felt & Young, Science, n. s., xx, 312, 1904.
Culex cinereoborealis Felt, Bull. 79, N. Y. State Mus., 312, 1904.
Culicada cinereoborealis Felt, Bull. 79, N. Y. State Mus., 391*b*, 1904.
Culex trichurus Dyar, Journ. N. Y. Ent. Soc., xiii, 109, 1905.
Culicada trichurus Felt, Bull. 97, N. Y. State Mus., 447, 478, 1905.
Grabhamia trichurus Dyar, Proc. Ent. Soc. Wash., vii, 48, 1905.
Aëdes trichurus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 191, 1906.
Ochlerotatus cinereoborealis Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 18, 20, 1906.
Ochlerotatus trichurus Dyar, U. S. Dept. Agr., Bur. Ent., Circ. 72, 4, 1906.
Culicada trichura Theobald, Mon. Culic., iv, 357, 1907.
Culicada cinereoborealis Theobald, Mon. Culic., iv, 367, 1907.
Culicada trichura Theobald, Mon. Culic., v, 305, 1910.
Culicada cinereoborealis Theobald, Mon. Culic., v, 307, 1910.

ORIGINAL DESCRIPTION OF CULEX TRICHURUS:

Culex punctor Kirby, is one of those single-brooded, early developing mosquitoes that would seem especially adapted to an arctic climate. Three-fourths of the year is spent in the egg state. The eggs, lying in marshy places frozen up over winter, hatch as soon as the ice has melted in the spring. The larval stages are passed in about three weeks, even in very cold water and the adults emerge immediately. They may fly possibly for six weeks, when the eggs being laid, they die and the species disappears, apparently, for the season. With these habits the insect ought to occur throughout the arctic circle. I met with it in Canada in the mountains of eastern British Columbia (Proc. Ent. Soc. Wash., vi, 39, 1904). A single fully grown larva, apparently the last one of a brood, was found on May 31. It soon pupated and the imago occurred on June 4. Other mosquitoes were flying at this time over the swamp where the larva was found and were supposed to be of the same species. On being imprisoned, they were fed on sugar and water. After being in confinement for two weeks, a female deposited eggs on the surface of the water. They were kept in water all the summer and following winter and hatched as soon as the ice melted the following spring. The eggs were laid singly. They are peculiar, being very wide and angularly shaped. They float at first, but soon sink or become adherent to objects at the side of the pool or floating on it.

On rearing the eggs that had hibernated, I was surprised to find that the larvæ differed markedly from *punctor* and were obviously a distinct species, the imagoes of which I had confounded with *punctor*, I have referred to the egg as that of *punctor* (Proc. Ent. Soc. Wash., VI, 39, 1904); this reference should be cancelled. The mature form I have in only very slender material. The original female from which the eggs were obtained is badly rubbed and a male bred by Dr. Dimmock at Springfield, Mass., from an identical larva, is broken. Mr. Coquillett has kindly examined the specimens and does not detect any difference; but he considers the material too poor to form an opinion on. I am inclined to designate this form provisionally as *Culex trichurus*, in order that it may be referred to. The name is given in allusion to the unusually hairy air tube of the larva, since it is the only species of the short-tubed group that has more than a single hair tuft.

EARLY STAGES OF CULEX TRICHURUS DYAR.

Egg.—Thickly fusiform, the ends well tapered, one side more bulging than the other. Black, the surface very finely granular shagreened all over, no sculpturing, no mucilage. Laid loosely, floating, but sinking at the first touch or adhering by surface tension to marginal objects. Length 0.6 mm., width 0.3 mm.

Stage I.—Head rounded, flattened, normal; antennæ moderate, equal, with small spinules, terminal digits and tuft of hair at the middle of the joint, all darkly infuscated. Body moderate, equal, submoniliform, normal; hairs moderate, becoming gradually less posteriorly. Air tube moderate, about three times as long as wide, the basal two thirds colorless, the tip infuscated; pecten of two rows of flat, dentate plates with long marginal spine, the single hair arising well within the pecten and nearly at the middle of the tube. Lateral comb of the eighth abdominal segment a row of obscurely digitately spined teeth with central longer spine in a single row, parallel, approximate, six, seven or eight in number. Anal segment with a small, rounded quadrate dorsal plate, darkly infuscated; terminal hairs and four anal processes normal; no ventral brush. The body is pigmented in brown over the dorsal region.

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Stage II.—Head rounded, flattened, normal, darkly infuscated, the antennæ moderate, uniform, with normal terminal spines and hairs, sparsely spinulose, darkly colored throughout; a small tuft of two hairs at basal third. Body normal, darkly pigmented dorsally; air tube short, about twice as long as wide, abruptly tapered, infuscated throughout, the last three pecten teeth stouter and more remotely placed than the basal ones, the single hair tuft arising before the middle of the tube; pecten teeth are stout spines with two short basal branches. A double row of small hair tufts on the dorsal aspect of the tube. Lateral comb of the eighth segment consists of seven to nine single, thorn-shaped teeth with finely pectinated bases, arranged in an irregular transverse row. Anal segment with a small dorsal plate and terminal tuft; ventral brush present, small, arising from a barred area, which is preceded along the ventral line of the segment by small, but distinct hairs. Anal process four, moderate, not inflated, without conspicuous tracheæ.

Stage III.—As in Stage II. Air tube two and a half times as long as wide, its dorsal hairs forming distinct tufts, the teeth of the pecten exceeding the tuft. Head brown, infuscated; a small tuft at the middle of the antennæ, moderate, brown. Body normal.

Stage IV.—Head brown, infuscated, the antennæ moderate, equal, brown, the small tuft at the middle. Body normal, the hair tufts heavy, with large chitinous plates, the abdominal ones slight, diminishing posteriorly. Comb of the eighth segment of twelve large thorn-shaped teeth; air tube two and a half times as long as wide, abruptly tapered, the tuft before the middle, followed by large detached teeth of the pecten, with three small tufts below and a double row of hair tufts above. Anal segment not ringed; with distinct tufts before the barred area; anal tuft and brush normal, large. Anal processes four, moderate, not conspicuously tracheate.

Pupa.—As usual in *Culex*.

ORIGINAL DESCRIPTION OF CULEX CINEREOBOREALIS:

A larva somewhat resembling and associated with *Culex impiger* presents marked differences in that the dorsal surface of the air tube is provided with a double row of hairs, each row consisting of about four tufts composed of a pair of weakly barbuled hairs. This is undoubtedly the larva which Messrs. Dyar & Knab * have confused with that of *Culex impiger*. From this larva a large, brownish-gray mosquito 6 to 7 mm. long, with the curved scales of the head white, was obtained. This species has been given the name of *Culex cinereoborealis* n. sp.

* Ent. Soc. Wash. Proc., 6: 144. 1904.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES TRICHURUS:

Female.—Proboscis moderate, cylindrical, uniform; labellæ conically tapered; vestiture brownish-black; setæ on labellæ minute, outstanding. Palpi short, about one-fourth as long as the proboscis, black with a few whitish scales intermixed; setæ moderate, bristly. Antennæ filiform, the joints subequal, rugose, pilose, black, second joint longer than third, slightly thicker and pale at base; tori subspherical, with a cup-shaped excavation, luteous, darker within, with a patch of whitish scales; hairs of whorls short, sparse, black. Clypeus rounded triangular, prominent, black, nude. Eyes black. Occiput black, scales on vertex lanceolate, curved, on sides broad, milky-white throughout, an ill-defined lateral black patch; many short, erect, forked white scales; bristles along margins of eyes black, those projecting between the eyes pale.

Prothoracic lobes elliptical, remote dorsally, black, clothed with narrow white scales and dark bristles. Mesonotum black, clothed with rather broad curved scales, a very broad stripe of light bronzy-brown scales covering dorsum and half of lateral area, scales along anterior edge, sides of disk and covering the antescutellar space sordid white, forming a deep incision into the brown area at middle of sides; a short brown stripe at sides of antescutellar space. Scutellum trilobate, black, clothed with narrow, curved white scales, each lobe with a group of brown bristles. Postnotum elliptical, prominent, blackish, nude. Pleuræ brown, coxæ luteous, clothed with patches of elliptical, flat white scales and rows of pale bristles.

Abdomen subcylindrical, tapering posteriorly; dorsal vestiture black, with broad, white, basal segmental bands which widen to triangular patches on the

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sides; first segment with a large patch of white scales and with many fine pale hairs; venter largely whitish scaled, with small, black, segmental medio-apical spots. Cerci black.

Wings rather broad, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell slightly longer than its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales blackish-brown, the outstanding ones broadly linear. Halteres whitish, with yellowish knobs.

Legs moderately long and slender; femora yellowish-white scaled below and black above, a black ring before tip; tibiæ largely dirty white scaled below, bronzy-black above with a few white scales intermixed, tips black; tarsi bronzy-black, the basal joint beneath with scattered white scales becoming fewer outwardly, terminal joints entirely black. Claw formula, 1.1–1.1–1.1.

Length: Body about 5.5 mm.; wing 5 mm.

Male.—Proboscis slender, rather long, straight, black scaled. Palpi exceeding the proboscis by nearly the length of the last joint; end of long joint and last two joints somewhat swollen; vestiture black; hairs on end of long joint and the last two joints dense, long, brown with ochreous reflections in certain lights. Antennæ plumose, the last two joints long and slender, pilose, blackish, the others shorter, pale, with black rings at insertions of hair-whorls; hairs of whorls long, dense, brownish black with silky luster. Coloration similar to the female. Abdomen elongate, depressed, broadest on sixth and seventh segments, narrowest at third; white basal segmental bands broader than in female; lateral ciliation long, abundant, pale yellowish brown. Wings narrower than in the female, stems of the fork-cells longer, vestiture less abundant. Claw formula, 2.1–2.1–1.1.

Length: Body about 6 mm.; wing 5 mm.

Genitalia (plate 24, fig. 166): Side-pieces more than twice as long as wide; apical lobe well developed, prominent, continued narrowly along side-piece to basal lobe, which is conically prominent and bears numerous long setæ and a central stout spine. Clasp-filament slender, slightly expanded in the middle, notched towards apex and bearing a few fine setæ, a long, articulated terminal spine. Harpagones with a very long columnar stem, the stem itself nearly long enough to reach to tip of side-piece, uniform, setose towards base, and a short, fusiform, terminal filament, which bears a series of parallel, transverse, strongly, elevated narrow ridges, angularly expanded beyond the middle. Harpes elliptical, concave, curved, inner margin thickened and revolute, tip pointed and curved outward. Unci approximate, revolute, forming a large basal cylinder. Basal appendages approximate, bearing four or five stout terminal setæ.

Larva, Stage IV (plate 119, fig. 410).—Head rounded, narrowed before eyes, a slight notch at insertion of antennæ, front margin broadly arcuate. Antennæ subcylindrical, slightly tapered, one side with many stout oblique spines; tuft moderate, a little before middle; three terminal spines and a long one and a short digit. Upper pair of dorsal head-hairs double or triple, lower single, ante-antennal tuft multiple. Mental plate triangular, an apical tooth and fourteen on each side, becoming larger and more remote basally, the last one small. Eyes large, transverse, pointed. Mandible quadrangular, a few spines at base; four outer filaments, two long and two short; a row of cilia from a collar; sixteen filaments on outer edge, the two nearest the collar smaller and feathered; dentition of four teeth on a process, the first longest; a spine before, a tooth at base, three below, a broad serrate filament and five slender ones within; process below furcate, with tufts of hair; basal angle slight; two filamentous hairs within, four below and a dense row near base. Maxilla shortly hemispherical, divided by a band-shaped suture; inner half densely haired, a crown of hairs at vertex; outer half with a few short spines near the palpus, two filaments next the suture and a spine on the other side; palpus stout, with four apical digits convergently appressed. Thorax

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rounded, wider than long; hairs abundant, moderate, subdorsal prothoracic ones single. Abdomen moderately long, anterior segments shorter; lateral hairs triple on first segment, double on second and third, single on fourth to sixth; tracheal tubes rather broad, band-shaped. Air-tube stout, gradually tapered on outer two-thirds, about three and one-half times as long as wide; pecten reaching three-fourths the length of tube, the teeth beyond basal third widely detached; single spine long, but little widened at base, smooth or with a short branch; a long hair-tuft within the pecten near middle of tube; four other small tufts along the ventral line above the pecten; four or five tufts on dorsal surface. Lateral comb of eighth segment of few scales in a partly double row; single scale thorn-shaped with pointed base, terminal spinule very stout, the sides fringed with short spinules. Anal segment about as long as wide, the plate dorsal, extending well down the sides; dorsal tuft a brush and hair on each side; a small double lateral hair; ventral brush well developed, extending basally beyond barred area; anal gills moderate, ensiform, longer than the segment.

The larvæ develop in the early spring pools from overwintering eggs. There is but a single generation in the year, the females living two or three months in the woods, but not frequenting open places nor houses. The habits are the same as those of the other early spring species, with which this occurs mixed.

Northeastern United States and Canada.

West Springfield, Massachusetts, April 23, 1905 (F. Knab); Springfield, Massachusetts (G. Dimmock); Pike, New Hampshire, May 25, 1908 (A. D. Hopkins); Dublin, New Hampshire, May, 1909 (A. Busck); Plattsburg, New York, May, 1905 (H. G. Dyar); Karner, New York, May 16, 1904 (E. P. Felt); Ithaca, New York, May 16, 1901 (O. A. Johannsen); Saxeville, Wisconsin, May 31, 1909 (B. K. Miller); Ottawa, Ontario, May 16, 1900 (J. Fletcher); Chelsea, Ontario, May 17, 1902 (A. Gibson); Aweme, Manitoba, June 3, 1904 (N. Criddle); White River, Ontario, June 25, 1907 (F. Knab); Banff, Alberta, (N. B. Sanson); Kaslo, British Columbia, June 25, 1903 (H. G. Dyar).

The names *trichurus* and *cinereoborealis*, proposed for this species, are simultaneous, as the respective publications were mailed on the same day, as we learn from the printers. We therefore depend upon the dates printed on the numbers of the publications, and give precedence to the former name.

AËDES TRISERIATUS (Say) Dyar & Knab.

Culex triseriatus Say, Journ. Acad. Nat. Sci. Phil., iii, 12, 1823.
Culex triseriatus Wiedemann, Ausser. Zweifl. Ins., i, 11, 1828.
Culex triseriatus Say, Ent. of No. Amer., ii, 40, 1883.
Culex triseriatus Giles, Handb. Gnats or Mosq., 317, 1900.
Culex triseriatus Smith, Ent. News, xiii, 301, 1902.
Culex triseriatus Dyar, Science, n. s., xvi, 672, 1902.
Culex triseriatus Dyar, Journ. N. Y. Ent. Soc., xi, 25, 1903.
Culex triseriatus Johannsen, Bull. 68, N. Y. State Mus., 416, 423, 1903.
Culex triseriatus Dyar, Proc. Ent. Soc. Wash., v, 143, 1903.
Culex triseriatus Felt, Bull. 79, N. Y. State Mus., 335, 1904.
Culicada triseriatus Felt, Bull. 79, N. Y. State Mus., 391*b*, 1904.
Culex triseriatus Smith, Bull. 171, N. J. Agr. Exp. Stat., 38, 1904.
Culex triseriatus Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 272, 1905.
Grabhamia triseriatus Dyar, Proc. Ent. Soc. Wash., vii, 48, 1905.
Culex triseriatus Blanchard, Les Moustiques, 288, 1905.
Finlaya ? nigra Ludlow, Can. Ent., xxxvii, 387, 1905.
Grabhamia triseriata Dyar, Journ. N. Y. Ent. Soc., xiii, 108, 1905.
Culicada triseriatus Felt, Bull. 97, N. Y. State Mus., 447, 477, 1905.
Culex triseriatus Britton & Viereck, Rept. Conn. Agr. Exp. Sta., 1904, 269, 272, 273, 1905.
Aëdes triseriatus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 195, 1906.
Ochlerotatus triseriatus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 19, 1906.
Ochlerotatus triseriatus Dyar, U. S. Dept. Agr., Bur. Ent., Circ. 72, 5, 1906.

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Culex triseriatus Howard, Osler's Modern Medicine, i, 377, 1907.
Protomacleaya triseriata Theobald, Mon. Culic., iv, 254, 1907.
Culex (Ochlerotatus) triseriatus Viereck, 1st Ann. Rept. Comm. Health Pa., 470, 1908.
Aëdes triseriatus Thibault, Proc. Ent. Soc. Wash., xii, 19, 1910.
Finlaya (?) nigra Theobald, Mon. Culic., v, 467, 1910.
Protomacleaya triseriata Theobald, Mon. Culic., v, 250, 1910.
Aëdes triseriatus Morse, Ann. Rept. N. J. State Mus., 1909, 719, 1910.

ORIGINAL DESCRIPTION OF CULEX TRISERIATUS:

Anterior margin of the wings fuscous; tergum with white spots on each side.

Inhabits Pennsylvania.

Body brown; *stethidium* livid-brown; *thorax* with white hair each side; *pleura* with two spots of white hair; *feet* pale, covered with dusky hair; *thighs* naked, blackish above near the tip; *tergum* with a triangular white spot at the base of each segment on each side; each of these spots extends upon the venter in the form of a band, interrupted each side of the middle; thus forming three spots on each series upon that part, the middle ones of which are almost connected into a longitudinal line.

Length one-fifth of an inch. ♀

The white spots contrast strongly with the brown colour of the abdomen.

ORIGINAL DESCRIPTION OF FINLAYA ? NIGRA:

♀. Head black, densely covered with ochraceous, almost white, scales, broad spindle-shaped and forked scales on the occiput, extending up to the vertex, spindle-shaped scales around the eyes, flat scales on the sides, a few light bristles extending forward between the eyes, and dark ones around the eyes; antennæ very dark brown, almost black, apparently fourteen-jointed, verticels brown, pubescence white, a few scales on the first joint, basal joint testaceous, with fine light erect hairs, and a few small flat scales; proboscis very dark brown, with violaceous reflections; palpi very dark brown, not unusually heavily scaled, a few hairs at the tip; clypeus dark brown, eyes dark brown.

Thorax black; prothoracic lobes clothed with flat white scales; mesothorax with dark brown curved scales, except the sides and "shoulders," the former heavily covered with broad spindle-shaped white scales, the latter with white broad-ended flat scales, a line of broad curved white scales around the "bare space," some light bristles projecting forward at the nape, a short line of them near the "bare space," and a heavy bunch over the wing joint; scutellum partly denuded, but the basal row of scales is *curved*, the remainder flat. The scales on the mid lobe white, those on the lateral lobes a very dark brown, long light bristles, probably six, on the mid lobe; pleura very dark, with a few large patches of white flat scales; metanotum dark brown.

Abdomen dark, heavily scaled with dark brown flat scales (with violaceous reflections), and small white, basal, lateral spots, apical hairs light; venter mostly white-scaled, but dark apical bands on some of the distal segments. There is some suggestion of tufts on the ventral side, but not well marked, and may be due to the position in which the specimen dried.

Legs: coxae and trochanters light and sparsely light scaled; ventrally the femora are all light scaled, and in the hind legs are dorsally light scaled about one-half (basal) their length, and are rather heavily bristled. The remainder of the legs is brown, with the exception of a rather brilliant knee spot on the hind legs, a smaller one on the mid legs, and in some lights a light line the length of the fore tibiæ on the caudal side; ungues rather large and heavy, equal and uniserrate.

Wings clear, brown veined, rather heavily scaled with dark, broad, truncated brown scales, suggesting typical *Taeniorhynchus* scales, and having violaceous reflections. Fork cells very long; 1st submarginal about a fifth longer and somewhat narrower than the 2nd posterior cell, stem not half the length of the cell, and the same length as that of the 2nd posterior; the supernumerary cross vein a little interior of the mid, and about the same length, the posterior nearly twice as long as the mid cross-vein, and more than double its own length interior; halteres light. The third vein extension is more marked than often found, but not so decided as in *Desvoidea fusca*, Theob.

Length 5.5 mm. Taken Aug. 3, 1905. Habitat, Rock Island Arsenal, Ill.

Described from one specimen sent by Dr. G. G. Craig, Cont. Surg., U. S. A., in some very interesting collections from Rock Island Arsenal. While the characteristics do not agree fully with Theobald's definition of *Finlaya*, they correspond more closely to those of this than to those of any other existing genus, and I have therefore referred it, provisionally at least, to *Finlaya*. The species is extremely interesting, because it is, so far as I can ascertain, the first having this peculiar grouping of scales to be reported from the United States.

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DESCRIPTION OF FEMALE, MALE, LARVA, PUPA, AND EGG OF AËDES TRISERIATUS:

Female.—Proboscis rather long and slender, subcylindrical; labellæ conically tapered; vestiture black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, less than one-fourth the length of proboscis, clothed with black scales; bristles rather long, black. Antennæ slender, filiform, the joints subequal, rugose, pilose, black; second joint a little swollen towards base, pale at its basal insertion; tori subspherical, with a cup-shaped apical excavation, luteous, black on inner side with some minute black setæ; hairs of whorls moderate, sparse, black. Clypeus roundedly triangular, prominent, black, nude. Eyes black. Occiput black, clothed with narrow, curved, yellowish silvery-white scales on vertex, flat silvery-white ones on the sides; many erect, forked, pale-yellowish scales on the nape; setæ along margins of eyes black, those projecting between the eyes pale yellow.

Prothoracic lobes elliptical, remote dorsally, blackish, largely clothed with flat silvery-white scales and pale bristles. Mesonotum black, clothed with narrow curved scales, deep brown on dorsum, silvery-white at anterior margin and on the sides, the white forming a deep indentation at the middle of the sides, the dorsal brown area widening behind the middle and divided behind by the antescutellar space, which is edged with silvery-white scales. Scutellum trilobate, clothed with whitish scales, each lobe with a group of brownish black bristles. Postnotum elliptical, prominent, brownish, nude. Pleuræ blackish, coxæ luteous, clothed with patches of flat triangular silvery-white scales and rows of pale bristles.

Abdomen subcylindrical, tapering posteriorly; dorsal vestiture blue-black, with pale bristles at ends of segments, a series of large, triangular, silvery-white, lateral basal segmental patches extending beneath nearly to apices of segments; venter silvery-white, apices of sixth and seventh segments blue-black. Cerci black.

Wings rather narrow, hyaline, slightly infuscated; petiole of second marginal cell shorter than its cell, that of second posterior cell also somewhat shorter than its cell; basal cross-vein more than its own length distant from anterior cross-vein; scales on veins blue-black or brown, the outstanding ones narrowly ligulate. Halteres whitish.

Legs rather long and slender; hind femora yellowish-white on basal third above, on basal two-thirds below, the rest blue-black; knees white; fore and mid femora black above to base; tibiæ blue-black, the tips of tibiæ slightly yellowish, fore and mid pair pale scaled beneath; tarsi entirely blue-black scaled. Claw formula, 1.1–1.1–0.0.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis straight, moderately long, black scaled. Palpi slightly longer than the proboscis, blunt at tip, black scaled, a minute white ring before middle of long joint; last two joints and end of long joint slightly thickened and with long black hairs. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others whitish, black at insertions of hair-whorls; hairs of whorls long, dense, black, with brownish luster. Coloration similar to the female. Abdomen elongate, slender, depressed; lateral spots on segments 5, 6 and 7 very large, eighth segment nearly entirely white scaled; venter black scaled, with segmental basal silvery bands; lateral ciliation moderately abundant, irregular, of fine pale hairs. Wings narrower than in the female, the stalks of the fork-cells longer, the vestiture hardly less abundant. Claw formula, 1.1–1.1–0.0.

Length: Body about 6 mm.; wing 4.5 mm.

Genitalia (plate 31, fig. 207): Side-pieces about twice as long as wide, conical, basal and apical lobes absent; a small area of dense setæ representing the basal

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lobe. Clasp-filament small, slender, with a long articulated terminal spine nearly half as long as filament. Harpes elliptical, concave, inner margin thickened and revolute, tip pointed and recurved. Harpagones with a stout columnar base which has a blunt projection in the middle and is minutely pilose and with a long slenderly ligulate articulated filament, longer than the stem and pointed at the tip. Unci approximate, revolute, forming a small basal cylinder. Basal appendages undeveloped.

Larva, Stage IV (see figure of the entire larva, plate 74).—Head rounded, narrowing slightly before eyes, front margin broadly arcuate. Antennæ long, cylindrical, slender, smooth, a single hair a little before the middle; four setæ of various lengths at tip and a digit on a pedestal. Eyes large, transverse, bluntly pointed. Upper pair of dorsal hairs single, lower pair double, ante-antennal tuft multiple. Mental plate triangular, rather small; central tooth large, nine side teeth more remotely spaced toward base. Mandible quadrangular, outer edge straight, a patch of short spines near base; two filaments toward tip from a distinct notch; an outer row of cilia from a collar; twelve filaments on outer edge; dentition of four teeth on a process, the first longest, a curved tooth before, two little forked ones at base; process below furcate, with groups of hairs and a long row down to below base; five hairs within, three long ones below base; lower angle small; six stout long hairs toward base. Maxilla conical, elongate, divided by a suture; inner half with hairs which are coarse inwardly, a small tuft at tip; outer half with a group of hairs and some small spines, two filaments near the suture; palpus small with four digits at tip. Mouth-brushes moderate, normal. Thorax rounded, wider than long; hairs rather abundant, rather short, the anterior prothoracic tufts well developed. Abdomen stout, rather long, the anterior segments short and transverse; hairs moderate, the laterals of first two segments multiple, those of second to sixth segments double, long; many short secondary hairs and distinct tufts; tracheal tubes broad. Air-tube stout, subcylindrical, the tip rather bluntly rounded, about two and a half times as long as wide; pecten reaching to middle of tube, uniform, dense, the spines long, wider at base; a single hair beyond the pecten. Lateral comb of eighth segment of few scales in a partly double row; single scale elongate, tapering, fringed throughout with small spines, without larger terminal one. Anal segment as wide as long, dorsal plate reaching near ventral line; dorsal tuft a long hair and brush on each side; a rather large lateral tuft at angle of plate; ventral brush well developed, of loose long-stemmed tufts, extending well toward base. Anal gills long, stout, sack-shaped, bluntly rounded.

Pupa (plate 149, fig. 708).—Thoracic mass heavy, pyriform; air-tubes small, slightly expanded. Abdomen relatively rather slender; a dorsal fan-shaped tuft on the first segment; hairs rather numerous toward posterior margins of segments; a double hair at posterior angles of seventh segment, a tuft at posterior angles of eighth segment. Anal paddles ovate, with a stout terminal bristle.

Egg (plate 146, fig. 676).—Fusiform, flattened on one side, the micropylar end more bluntly rounded than the other, with a gelatinous cushion; sculpture regularly hexagonal; color black.

The larvæ live normally in the water in holes in the trunks of trees; occasionally they frequent artificial receptacles in wooded situations, more particularly those made of wood. The eggs are laid upon the sides of the cavity, just above the water line, singly or in groups of two to five, with the long diameter upright, attached firmly to the surface. As the water dries, the eggs remain, and when not wet with water that season, or if late in the season whether dry or wet, hibernate. When covered with water the eggs hatch. There are probably several broods during the season, though this has not been determined. The appearance of female adults all through the summer may be due to the successive developments

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of larvæ from eggs hatching at different times, but all overwintered. The adults frequent woods, and bite freely by day in shaded places. Dr. Dyar considers the bite most annoying of that of any of the common eastern species, since the bite leaves a swelling and irritation lasting longer than with other species. This species is especially prevalent in dry wooded regions in summer, where standing water upon the ground is scarce or absent, and the only breeding-places containing water are the deep holes in trees. In the dry mountains of Virginia and North Carolina, this, with the other tree-hole inhabiting mosquitoes, *Orthopodomyia signifer, Cœlodiazesis barberi,* and *Megarhinus septentrionalis,* are practically the only mosquitoes met with. Professor Smith says: "In no instance was this form included in the captures made after dark," and it is probable that it is active by day only.

United States, east of the Rocky Mountains.

Center Harbor, New Hampshire, June 24, 1902 (H. G. Dyar); White Mountains, New Hampshire (H. K. Morrison); Durham, New Hampshire, August 8, 1902 (H. G. Dyar); Mt. Holyoke, Massachusetts, larvæ April, 1905 (Dyar and Knab); West Springfield, Massachusetts, August 16, 1903 (F. Knab); Lahaway, New Jersey, June 6, 1903 (J. T. Brakeley); Washington, District of Columbia, September 11, 1903 (J. Kotinsky); Plummer's Island, Maryland, June 5, August 19, 1903 (W. V. Warner); Herzog's Island, Maryland, June 24, 1906 (F. Knab); Woodstock, Virginia, June 2, 1903 (F. C. Pratt); Bluemont, Virginia, June 20, 1904 (F. C. Pratt); Lake Drummond, Virginia, June 8, 1905 (H. S. Barber); Difficult Run, Virginia, July 11, 1906 (Knab and Barber); Falls Church, Virginia, September 4, 1906 (A. N. Caudell); River Township, Henderson County, North Carolina, October, 1901 (J. L. Coker, jr.); Columbia, South Carolina, August 1, 1906 (————); McClellanville, South Carolina, October 10, 1906 (————); Ames, Iowa, August 17, 1906 (H. J. Quayle); St. Louis, Missouri, September, 1904 (A. Busck); Lawrence, Kansas, May (H. T. Martin); Atlanta, Georgia, May 11, 1900 (W. B. Summerall); Fort Valley, Georgia (J. H. Beatty); Ormond, Florida, March 16, 1905 (Dyar and Caudell); New Smyrna, Florida, March 21, 1905 (Dyar and Caudell); Miami, Florida, March 8, 1905 (Dyar and Caudell); Corbin, Kentucky, August 24, 1904 (H. S. Barber); Helena, Arkansas, July 30, 1904 (H. S. Barber); Scott, Arkansas, June 1-10, 1909 (J. K. Thibault, jr.); Wister, Indian Territory, July 7, 1904 (H. S. Barber); Rives, Tennessee, July 7, 1904 (H. S. Barber); Athens, Tennessee, August 21, 1904 (H. S. Barber); Decherd, Tennessee, August 18, 1904 (H. S. Barber); Chattanooga, Tennessee, August 20, 1904 (H. S. Barber); Corinth, Mississippi, August 19, 1904 (H. S. Barber); Belzona, Mississippi, August 4, 1904 (H. S. Barber); Westpoint, Mississippi, August 11, 1904 (H. S. Barber); Jackson, Mississippi, August 8, 1904 (H. S. Barber); Clarksdale, Mississippi, August 1, 1904 (H. S. Barber); Agricultural College, Mississippi, May 4, 1905 (G. W. Herrick); Denison, Texas, June 25, 1904 (H. S. Barber); Cypress Bayou, Texas, August 23, 1903 (J. D. Mitchell); Victoria, Texas, October 5, 1904 (E. G. Hinds).

The larva of *Aëdes triseriatus* is liable to be mistaken for that of *Aëdes calopus,* which it much resembles, and like it often occurs in aritificial receptacles. This is the only tree-hole *Aëdes* occurring in temperate North America, in the East, unless we include *Aëdes calopus,* the "yellow-fever mosquito," as such. However, *Aëdes calopus* is not endemic in temperate regions.

AËDES AURIFER (Coquillett) Dyar & Knab.

Culex perturbans Smith (not Walker), Ent. News, xiii, 300, 1902.
Culex aurifer Coquillett, Can. Ent., xxxv, 255, 1903.
Culex aurifer Smith, Ent. News, xv, 148, 1904.

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Culex aurifer Dyar, Journ. N. Y. Ent. Soc., xii, 172, 244, 1904.
Culex aurifer Felt, Bull. 79, N. Y. State Mus., 336, 1904.
Culicelsa aurifer Felt, Bull. 79, N. Y. State Mus., 391b, 1904.
Culex aurifer, Smith, Bull. 171, N. J. Agr. Exp. Sta., 38, 1904.
Culex aurifer Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 298, 1905.
Culicelsa aurifer Felt, Bull. 97, N. Y. State Mus., 448, 473, 1905.
Pseudoculex aurifer Dyar, Proc. Ent. Soc. Wash., vii, 47, 1905.
Culex aurifer Blanchard, Les Moustiques, 629, 1905.
Aëdes aurifer Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 193, 1906.
Ochlerotatus aurifer Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 19, 1906.
Ochlerotatus aurifer Dyar, U. S. Dept. Agr., Bur. Ent., Circ. 72, 4, 1906.
Culicada aurifer Theobald, Mon. Culic., iv, 351, 1907.
Culicada aurifer Theobald, Mon. Culic., v, 305, 1910.
Aëdes aurifer Morse, Ann. Rept. N. J. State Mus., 1909, 720, 1910.

ORIGINAL DESCRIPTION OF CULEX AURIFER:

Female. Near *triseriatus*, but the scales on sides of mesonotum golden yellow instead of white, and the venter is without crossbands of black scales. Black, the halteres, coxæ and femora largely yellow; scales and hairs of palpi brown, scales of occiput golden yellow, the upright ones brown; scales in middle of mesonotum brownish black, those on the sides and many in front of the scutellum golden yellow, those of pleura pale yellow; scales of abdomen black, those on the venter pale yellow, sometimes encroaching a trifle on the dorsum, hairs of the first segment and at the apices of the others pale yellow; scales of femora and on posterior side of tibiæ pale yellow, remaining scales of tibiæ and those on the tarsi black, front tarsal claws toothed; wings hyaline, lateral scales of the veins long and narrow, hind cross vein about its length from the small cross vein, petiole of first submarginal cell three-fifths the length of the cell; length, 4.5 mm.

Three specimens, collected June 22 and 25, by Dr. H. G. Dyar.

Habitat.—Centre Harbour, N. H.

I have also examined two males and two females from Lahaway, N. J., bred by Dr. J. B. Smith, who writes that the larva is very different from that of *triseriatus*. The adult male is similar to the female except that the hairs of the palpi are chiefly whitish, and the dorsum of the abdomen has several yellow scales on the apical half.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES AURIFER:

Female.—Proboscis moderate, subcylindrical; labellæ conically tapered; vestiture black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth the length of the proboscis, clothed with black scales, the bristles rather long, short and numerous on penultimate joint, black. Antennæ filiform, the joints subequal, rugose, pilose, black; second joint a little swollen towards middle, pale at its basal insertion; tori subspherical, with a cup-shaped apical excavation, dark brown, black on inner side, with some minute black setæ; hairs of whorls moderate, sparse, black. Clypeus roundedly triangular, prominent, black, nude. Eyes black. Occiput black, clothed with narrow, curved scales on vertex, flat ones on sides, yellow in middle, a large black patch each side of vertex; scales on the sides sordid white, divided by a large, quadrate black patch; a number of erect, forked black scales on nape; setæ along margins of eyes black, a tuft of golden-yellow ones projecting between eyes.

Prothoracic lobes elliptical, remote dorsally, blackish, largely clothed with narrow, curved golden-yellow scales and pale bristles. Mesonotum black, clothed with lanceolate, curved scales which are dark bronzy-brown on dorsum, yellowish with golden luster on sides, the dark area forming a very broad median stripe, reaching the anterior edge, abruptly broadened on posterior half and divided behind by yellowish scales about the antescutellar space, a short, very narrow line of yellow scales on each side of antescutellar space. Scutellum trilobate, clothed with narrow, curved yellowish-white scales, each lobe with a group of brownish black bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ blackish, coxæ luteous, clothed with patches of flat elliptical yellowish-white scales below, narrow, curved yellow ones on prothoracic epimera, and rows of pale bristles.

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Abdomen subcylindrical, tapering posteriorly; dorsal vestiture blue-black, with brown bristles at ends of segments, a series of basal, triangular, dull yellowish-white, lateral segmental patches extending well towards apices of segments; first segment with a large patch of dirty white scales and many fine, pale hairs; venter sordid white, with ill-defined, apical, median black spots, most extensive on last two or three segments. Cerci black.

Wings rather broad, hyaline, slightly infuscated; petiole of second marginal cell shorter than its cell, that of second posterior cell also somewhat shorter than its cell; basal cross-vein about its own length distant from anterior cross-vein; scales on veins black, the outstanding ones narrowly ligulate, broader at apices of veins. Halteres whitish, with darker knobs.

Legs moderate; femora sordid-yellowish below, intermixed with black scales above, which predominate towards tip; knees yellowish-white scaled; vestiture of tibiæ and tarsi black with dull bronzy luster; tips of tibiæ slightly yellowish. Claw formula, 1.1–1.1–1.1.

Length: Body about 5 mm.; wing 4.5 mm.

Male.—Proboscis moderately long and slender, black scaled. Palpi slightly longer than proboscis, entirely black scaled; last two joints and end of long joint slightly thickened and with dense, long brown hairs. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others pale, black at insertions of the hair-whorls; hairs long, dense, black with brown luster. Coloration similar to the female. Occiput broadly yellowish-white scaled. Abdomen elongate, depressed; segments with large, subquadrate areas of pale scales, contiguous with base and apically indented, the sides continuously yellowish-white; venter whitish-scaled, with broad, nearly continuous, black median stripe, only slightly interrupted at bases of segments; lateral ciliation long, dense, regular, pale brown. Wings narrower than in the female, the stalks of the fork-cells longer, the vestiture less abundant and paler; scales on forks of second vein much broadened. Legs longer than in the female, the tibiæ and tarsi with brassy luster beneath. Claw formula, 1.1–1.1–1.1.

Length: Body about 5 mm.; wing 4 mm.

Genitalia (plate 29, fig. 196): Side-pieces over twice as long as wide, conical; apical lobe large, conically prominent, continued narrowly to base, where a large, stout spine indicates the basal lobe, a tuft of long very dense setæ at tip of side-piece. Clasp-filament long, slightly swollen in the middle, apex dentate and bearing three short setæ, a terminal articulated spine. Harpes elliptical, concave, inner margin thickened and revolute, tip pointed and recurved. Harpagones with a slender columnar base which has a blunt projection at outer fourth, bearing a small seta and minutely pilose, and apically with a long ligulate articulated filament, as long as stem and pointed at tip, with a sharp retrose branch beyond the middle. Unci approximate, revolute, forming a small basal cylinder. Basal appendages approximate, bearing four short stout spines.

Larva, Stage IV (see figure of the entire larva, plate 72).—Head broad, subquadrate, hind angles rounded, slightly narrowed before eyes, a broad notch at insertion of antennæ, front margin broadly arcuate. Antennæ very long, longer than head, outwardly curved at the middle, basally swollen, attenuated towards tip, covered with rather long spines; a large tuft beyond middle; three long coarse spines at tip and a short digit. Eyes large, transverse, pointed. Both pairs of dorsal head-hairs double, ante-antennal tuft multiple. Mental plate triangular, as broad as long, the terminal tooth projecting; nine side teeth, large, rather closely set, becoming more distant at base. Mandible quadrangular, wide at tip; a few short spines without at base; two long filaments toward tip; an outer row of stout cilia; nine filaments on outer edge, the terminal ones partly decumbent, basal ones with branching hairs; dentition of four teeth on a process, a

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tooth before as long as the others, three teeth at base, a broad filament and five serrate ones within; process below humped and cleft at tip, with hair patches; a rounded elevation below; four scattered filaments within; a row of seven long hairs at base. Maxilla elongate hemispherical, divided by a broad suture; inner half densely haired, except toward the suture, a row of very long hairs at tip; outer half with a patch of hair near base, two filaments near the suture and a spine on the other side near the tip; palpus small, constricted centrally, the four minute digits approximated on the summit. Thorax rounded, wider than long, angled at hair-tufts; hairs abundant, long, the subdorsal prothoracic ones single. Abdomen rather slender, the anterior segments shorter; hairs rather long; laterals of first two segments multiple, double on third to fifth, single on sixth; secondary subdorsal hairs in rather long tufts on third to fifth segments; tracheal tubes broad, band-shaped. Air-tube stout, tapered a little on apical two-thirds, over three times as long as wide; pecten reaching nearly to middle, the two distal teeth detached, followed by a single ample hair-tuft; single spine of pecten with a long shaft, wider at base, with six small branches toward base and sometimes small ones on the other side opposite the outer one. Lateral comb of eighth segment of many scales in a triangular patch; single scale elliptical, with eight stout side teeth, longer distally, and one very long simple apical spine. Anal segment longer than wide, the dorsal plate reaching well down the sides, incised at the lower angle; dorsal tuft a brush and hair on each side; a single lateral hair; ventral brush well developed, continued basally beyond barred area; anal gills moderate, tapered, about as long as the segment.

The larvæ occur in the early spring in pools in swamp-land from overwintering eggs. The adults appear early. Professor Smith has recorded the following observations, made in New Jersey:

"Though *aurifer* is by no means common anywhere, it is one of the most blood-thirsty species we have. It has never been found far away from its breeding places and does not enter houses, but does fly for some distance at night, and is not so closely confined to the woods as *canadensis*. If its haunts are entered during the day it attacks fiercely and fearlessly. Mr. Brakeley, who is the only person known to me who has any considerable personal acquaintance with this species, several times refers to this point in his notes and mentions the fact that when once the insect has tasted blood it is almost impossible to drive it off and it may be taken without difficulty. . . . . .

"The earliest date for adult *aurifer* is April 23d, the latest for larvæ is May 10th, from which the adult was bred May 13th. Adults were taken as late as July 24th, yet blood-thirsty, and occurred in considerable swarms during the last days of June. This would indicate an adult life period of nearly three months—much longer than we have been inclined to credit them with. It seems scarcely possible that a summer brood of larvæ could have been overlooked, since Mr. Brakeley collected continuously through June, and the Orange Mountains and Great Piece meadows were looked over again and again during the entire season.

"The dates above given are all from Lahaway, so that no objection can be made that the extremes are from different climatic conditions. That the matter was held in mind, Mr. Brakeley's notes of June 25, 1903, show clearly. He made a trip into *aurifer* territory, ran into a swarm and 'the whole shooting match made a dive for me, prompted by a thirst from end to end: bill first and legs last.' So thirsty were they and so much in a hurry that they did not even stop to sing, and so eager in sucking that there was no trouble in bottling the specimens that had gotten a hold. All the pools nearby were examined closely, but no larvæ, pupæ or signs of recent development were observed. The places where the larvæ had been found early in the season were then dry.

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"Previous to that, on May 29th, while one of the reservoirs was yet water covered, a very careful examination was made and all the places where larvæ were earlier taken were tested—without result so far as obtaining larvæ was concerned.

"Practically all our knowledge of this species comes from Mr. Brakeley's observations, though in 1904 Mr. Grossbeck took larvæ in the Great Piece Meadow, May 10th, from which a male adult was obtained May 13th, as against a dozen *canadensis* which emerged on the same date. Mr. Brehme, in collections of larvæ and pupæ made at Arlington, May 9th, also had one male of this species, which emerged May 13th. This indicates a somewhat general distribution in the State [New Jersey], but a rare occurrence at any point. No one save Mr. Brakeley has taken the adults in New Jersey, and all who have taken the larva have found it associated with that of *canadensis*.

* * * *

"In 1903 Mr. Brakeley sent in the first larvæ, March 23d, as extra large *canadensis*. Being advised of the difference, he found them afterwards in the larger bodies of water covering the bogs and reservoirs and in pools of considerable size nearby, always associated with *canadensis* and always comparatively rare. They do not hug the edge of the pool so generally as do some of the other species, but favor tufts of grass, rushes or vines several feet from shore. Larvæ only were collected until April 14th, at which time the first pupa was taken. Thereafter larvæ and pupæ were taken until well along in May, the latest actual date at which either larvæ or pupæ occurred being May 13th. No *aurifer* larvæ have been collected with the earliest *canadensis*, and from such data as I have at hand it seems that the eggs begin to hatch during the early days of March and that the larvæ grow quite rapidly at first, as though they might produce the earliest adults. But they linger in the last stage, and the first pupæ require from five to nine days to mature.

"Eggs of *aurifer* have not been obtained by me; but there seems little doubt that they are laid like those of *canadensis*, though probably different in form. The water is drawn from the bogs before the *aurifer* adults disappear, hence the eggs must be laid in the bog mud, where they rest until they become water covered again in late fall and hatch in the spring following. I have no evidence that there is more than one brood of this species. The pupa is recognizable from that of *canadensis* by its decidedly larger size and white air-tubes."

Northeastern United States.

Center Harbor, New Hampshire, July 22, 1902 (H. G. Dyar); Dublin, New Hampshire, June, 1909 (A. Busck); Westfield, Massachusetts, July 30, 1903 (F. Knab); Springfield, Massachusetts, May 21, 1903 (F. Knab); Suffield, Connecticut (G. Dimmock); Weekapaug, Rhode Island, July 5, 1904 (H. G. Dyar); Lahaway, New Jersey (J. T. Brakeley). Reported also from Elizabethtown, New York (Felt).

AËDES CUNEATUS Dyar & Knab.

Aëdes cuneatus Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 54, 1908.
Aëdes argentescens Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 55, 1908.
Aëdes cuneatus Theobald, Mon. Culic., v, 620, 1910.
Aëdes argentescens Theobald, Mon. Culic., v, 620, 1910.

ORIGINAL DESCRIPTION OF AËDES CUNEATUS:

Female.—Proboscis rather long, black-scaled; palpi entirely black-scaled; occiput pale yellowish-scaled, with a brown spot at each side; mesonotum deep brown-scaled, with slight luster, and with two narrow pale yellowish subdorsal stripes; these stripes are thickened along the median portion and become much narrowed on the posterior third, reaching the scutellum outwardly of the antescutellar bare

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space; they have a more or less distinct brassy luster; there are a few of these yellowish scales along the sides of the antescutellar bare space and the mid-lobe of the scutellum is clothed with similar scales; abdomen black-scaled above, without bronzy luster, with cream-white lateral basal segmental triangular patches; beneath cream-white scaled, with apical black segmental bands; wings with dark narrow scales along the veins; legs black-scaled, with bronzy luster; femora ventrally and basally white; tibiae of all the legs whitish-scaled on the inner side; tarsi not ringed; claws all toothed. Length, 4.5 mm.

In the male the palpi somewhat exceed the proboscis, black-scaled, with bluish luster, the terminal segments clothed with numerous long hairs; head densely yellowish scaled on the occiput, with a silvery luster; the yellowish thoracic stripes are much more diffuse behind the middle than in the female; the stripes become greatly expanded on the sides and they also coalesce more or less with the yellowish scaling around the antescutellar bare space; the abdomen is black-scaled above, the second segment with pale basal band, the succeeding segments with lateral basal triangular segmental white patches; the under surface white-scaled, with narrow apical black bands on the segments. Length, 5.5 mm.

Thirty-five specimens from Córdoba, Mexico, bred from larvæ in temporary puddles. (F. Knab)

Type.—Cat. No. 11964, U. S. N. M.

ORIGINAL DESCRIPTION OF AËDES ARGENTESCENS:

Female.—Proboscis long and slender, black-scaled; palpi black-scaled; head with the occiput clothed with silvery scales, a large and dark spot on each side; mesonotum clothed with deep brown scales and with two subdorsal lines of silvery scales; these lines are much broadened along their middle third, becoming much attenuated posteriorly, reaching the scutellum well to the sides of the antescutellar bare space; bare space bordered with silvery scales; scutellum silver-scaled; abdomen deep black, with coppery luster above, and with lateral basal segmental triangular silvery white spots; beneath creamy white, with large triangular black apical segmental lateral spots, which do not unite to form bands; wings with dark long and narrow scales along the veins; legs dark-scaled, with pronounced bronzy luster; the femora pale at base and beneath, tibiae narrowly pale-scaled on the under side; tarsi not ringed; claws toothed on all the feet. Length, 2.5 mm.

In the male the palpi exceed the proboscis, black-scaled, the terminal portion densely clothed with long black hairs; head with the vertex clothed with dull silvery scales; the markings of the mesonotum similar to those of the female, but the submedian stripes greatly expanded on the middle portion; abdomen black-scaled above, with slight coppery luster, the basal segmental lateral spots becoming united into bands on segments 3, 4, 6, and 7, eighth segment mostly whitish scaled. Length, 3.5 mm.

Six specimens from Córdoba, Mexico, and Almoloya, State of Oaxaca, Mexico, bred from larvæ in temporary puddles. (F. Knab)

Type.—Cat. No. 11965, U. S. N. M.

The light markings show a silvery metallic luster, with a grayish cast, which varies in intensity in different specimens.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES CUNEATUS:

Female.—Proboscis moderate, subcylindrical; labellæ conically tapered; vestiture brownish-black; setæ minute, curved, black, those on the labellæ more prominently outstanding. Palpi short, about one-fifth as long as the proboscis; vestiture of blackish-brown scales and moderate black setæ. Antennæ filiform, the joints subequal, rugose, pilose, black, second joint a little swollen towards middle, its base pale; tori subspherical, with a cup-shaped apical excavation, luteous, brown on inner side; hairs of whorls moderate, sparse, black. Clypeus rounded triangular, with a slight median groove, depressed, dark brown, nude. Eyes black. Occiput dark brown, clothed with narrow, curved scales on vertex, flat appressed ones on the sides, silvery-white, an indistinct brown spot on sides, a group of erect forked pale scales on nape; bristles along margins of eyes black, a tuft projecting forward between the eyes pale yellow.

Prothoracic lobes elliptical, remote dorsally, dark brown, clothed with narrow lanceolate pale scales and dark bristles. Mesonotum dark brown, clothed with narrow curved scales, dark bronzy brown on lateral thirds, medianly a rather broad, pale-brown longitudinal stripe, bordered on either side by a narrow dark-

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brown line followed outwardly by narrow silvery stripes, broader medianly and angularly produced at the middle; antescutellar space narrowly bordered by silvery scales. Scutellum trilobate, gray, with silvery scales, each lobe with a group of brown bristles. Postnotum elliptical, prominent, brown, nude. Pleurae brownish, coxae luteous, clothed with patches of flat, broadly triangular white scales and rows of golden bristles.

Abdomen subcylindrical, flattened, tapering posteriorly; dorsal vestiture black with brown luster, a series of lateral, basal, segmental, triangular, yellowish-white patches, largest on sixth and seventh segments; first segment with patches of black scales and with many long, fine, pale hairs; venter white with the apical lateral angles of segments black. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell somewhat shorter than its cell, that of second posterior about equal to its cell; basal cross-vein distant about its own length from anterior cross-vein; scales brown, the outstanding ones narrowly ligulate. Halteres whitish, with pale knobs.

Legs moderately long, slender; vestiture dark bronzy brown; under sides of femora yellowish-white nearly to the tips; tibiae and tarsi with paler luster beneath. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis straight, moderate, dull brown scaled. Palpi exceeding the proboscis by nearly the length of the last joint; vestiture entirely blackish-brown with submetallic luster; end of long joint and the last two joints slightly swollen, with long, dense black hairs. Antennae plumose, the last two joints long and slender, rugose, pilose, black, the others short, pale, with black rings at insertions of hair-whorls; hairs long, dense, dull brown. Coloration similar to the female. Abdomen elongate, depressed, with large, lateral, basal, segmental, white patches, very large on the sixth and seventh segments, the last segment entirely white scaled; lateral ciliation of abundant long, fine, pale hairs. Wings slightly narrower than in the female, the stems of the fork-cells longer, the vestiture sparse. Claw formula, 2.1–2.1–1.1.

Length: Body about 5.5 mm.; wing 4 mm.

Genitalia (plate 29, fig. 198): Side-pieces about three times as long as wide, rounded at tips; apical lobe rounded, low, not reaching far toward base; basal lobe low, but bearing fine hairs and a large, very stout curved spine. Clasp-filament long, slightly swollen mesially, with a long articulated terminal spine. Harpes elliptical, concave, tips thickened, pointed, curved. Harpagones with long, rather slender columnar stem, smooth, uniform; terminal filament with a lateral expansion which has four to five sharp retrose spines, its tip roundedly pointed. Basal lobes well separated, small, rounded, each with three short setae.

Larva, Stage IV (plate 119, fig. 412).—Head rounded, widest through eyes; antennae rather small, uniform, spinulated, with a small tuft before middle; both pairs of dorsal head-hairs single, ante-antennal tuft multiple. Body with the skin pilose. Lateral comb of eighth abdominal segment of numerous scales in a triangular patch, each scale with long central spine and long lateral fringe. Air-tube about two and a half times as long as wide, slightly tapered outwardly; pecten of about seventeen evenly and closely set teeth, reaching to near middle, followed by a single tuft of about eight hairs. Anal segment slightly longer than wide, ringed by the plate; dorsal tuft a long hair and tuft on each side; lateral hair single, small; ventral brush well developed, confined by the chitinous ring; anal gills long, thick at base, tapering to fine points, equal.

The larvae live in temporary ground-puddles. Mr. Knab got them in puddles in a stream-bed, associated with *Psorophora posticatus, Culex proclamator, Psorophora ciliata,* and *Psorophora virescens;* in a pool of clear water in a stream-bed, associated with *Culex derivator, Culex pinarocampa,* and *Anopheles*

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strigimacula; in a ditch of muddy water associated with *Culex coronator* and *Culex pinarocampa;* near a river in some holes in the ground filled with dead leaves, the water blue-back and almost opaque, associated with *Lutzia bigoti.* Mr. Barber captured a male on a cotton flower.

Southern Mexico to Central America.

Córdoba, Mexico, January 20, April 8, 1908 (F. Knab); Almoloya, State of Oaxaca, Mexico, July 19, 1905 (F. Knab); Cacao, Trece Aguas, Alta Vera Paz, Guatemala, April 8 and 15, 1906 (Schwarz & Barber).

After a careful study of specimens of *cuneatus* and *argentescens* we have reached the conclusion that they represent one species only. The larvæ and the male genitalia are the same, while both forms occurred in the same pools. The difference in coloration, therefore, is due to variation, and the name *argentescens* may be retained in a varietal sense to designate the form in which the thoracic markings are silvery instead of yellow. The specimens of the form *argentescens* average smaller than those of *cuncatus;* this would seem to indicate that the coloration is governed by nutrition, poorly nourished specimens becoming paler. There is, besides, considerable variation in the extent of the light subdorsal stripes and in the color of the median stripe; this latter in some specimens is deep brown like the lateral areas, thus producing a form similar to *Aëdes trivittatus.*

AËDES TRIVITTATUS (Coquillett) Dyar & Knab.

Culex trivittatus Coquillett, Journ. N. Y. Ent. Soc., x, 193, 1902.
Culex trivittatus Smith, Ent. News, xv, 145, 1904.
Culex trivittatus Felt, Bull. 79, N. Y. State Mus., 333, 1904.
Culicada trivittatus Felt, Bull. 79, N. Y. State Mus., 391*b*, 1904.
Culex inconspicuus Grossbeck, Ent. News, xv, 333, 1904.
Culex trivittatus Smith, Bull. 171, N. J. Agr. Exp. Sta., 38, 1904.
Culex trivittatus Britton & Viereck, Rept. Conn. Agr. Exp. Sta., 1904, 269, 272, 273, 1905.
Culex trivittatus Smith, N. J. Agr. Exp. Stat., Rept. Mosq., 286, 1905.
Culex inconspicuus Smith, N. J. Agr. Exp. Stat., Rept. Mosq., 295, 1905.
Culex trivittatus Blanchard, Les Moustiques, 339, 1905.
Culex inconspicuus Smith & Grossbeck, Psyche, xii, 18, 1905.
Culicada trivittatus Felt, Bull. 97, N. Y. State Mus., 447, 1905.
Culex inconspicuus Dyar, Journ. N. Y. Ent. Soc., xiii, 108, 1905.
Aëdes trivittatus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 197, 1906.
Aëdes inconspicuus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 199, 1906.
Ochlerotatus trivittatus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 18, 1906.
Ochlerotatus inconspicuus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.
Ochlerotatus trivittatus Dyar, U. S. Dept. Agr., Bur. Ent., Circ. 72, 5, 1906.
Ochlerotatus inconspicuus Dyar, U. S. Dept. Agr., Bur. Ent., Circ. 72, 5, 1906.
Pseudohowardina trivittata Theobald, Mon. Culic., iv, 224, 1907.
Culex inconspicuus Theobald, Mon. Culic., iv, 438, 1907.
Aëdes trivittatus Busck, Smiths. Misc. Colls., quart. iss., iii, 63, 1908.
Culex (Ochlerotatus) triviatus Viereck, 1st Ann. Rept. Comm. Health Pa., 470, 1908.
Culex (Ochlerotatus) inconspicuous Viereck, 1st Ann. Rept. Comm. Health Pa., 471, 1908.
Culex inconspicuus Theobald, Mon. Culic., v, 387, 1910.
Pseudohowardina trivittata Theobald, Mon. Culic., v, 227, 1910.
Aëdes trivittatus Morse, Ann. Rept. N. J. State Mus., 1909, 719, 1910.
Aëdes inconspicuous Morse, Ann. Rept. N. J. State Mus., 1909, 719, 1910.

ORIGINAL DESCRIPTION OF CULEX TRIVITTATUS:

Near *triseriatus*, but with three vittæ of blackish scales on the mesonotum. Black, the first joint of antennæ and base of second, the coxæ and greater portion of femora, yellow; scales of palpi black, those on the occiput light yellow, a large patch of dark gray ones on each side of the middle, the upright ones yellow; scales of mesonotum brassy yellow and with three broad vittæ of blackish ones, the median vitta not quite extending to either end of the mesonotum; scales of abdomen black, those at the front angles of the segments and on the venter whitish; scales of legs black, those on

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the coxae and on the posterior side of the femora and tibiae, covering nearly the whole of the hind femora, yellowish-white; tarsal claws rather large, one-toothed; wings hyaline, lateral elongated scales of the veins narrow and almost linear, second basal cell shorter than the first, petiole of first submarginal cell nearly one-half as long as that cell. Length, 4 mm.

Habitat.—Chester, New Jersey.

Two female specimens collected September 10 and 14 by Prof. J. B. Smith.

Type. No. 6702, U. S. N. M.

ORIGINAL DESCRIPTION OF CULEX INCONSPICUUS:

♀.—Head dark brown, occiput with pale yellow scales scattered over the surface; antennae dark brown, the two basal joints pale testaceous; proboscis and palpi dark brown. Mesonotum dark brown with yellowish scales at the sides, forming a rather diffuse central brown vitta; shoulders brown, separated from the vitta by a narrow line of yellow scales; scutellum brown with yellow bristles; metanotum blackish brown; pleura brown, with small patches of grayish white scales; halteres pale brown, darker at the apex. Abdomen deep brown, with narrow dirty white bands at base of segments, which widen out laterally; beneath it is pale brownish with scattered white scales, more so apically. Legs with coxae pale brown, femora brown, under side yellowish white, knee dot barely discernible; tibia and tarsi wholly brown; claws uniserrated on all feet; wings hyaline, petiole of first submarginal cell about one-third as long as this cell. Length 4 mm.

♂.—Palpi uniformly dark brown. Bands of abdomen narrow in the anterior segments, very wide in the posterior ones and with some mixed brown scales, giving the bands a dark appearance; beneath it is whitish, with brown scales intermixed. Claws of anterior and mid feet unequal, the larger biserrated, the smaller uniserrated; claws of posterior feet equal and uniserrated. Petiole of first submarginal cell about half as long as this cell. Length 4.5 mm. Otherwise as in the female.

Described from three ♂ and one ♀ bred from larvae gathered on Garret Mts., Paterson, N. J.

Type: In the collection of the New Jersey Experiment Station.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES TRIVITTATUS:

Female.—Proboscis rather long and slender, subcylindrical; labellae conically tapered; vestiture brownish-black; setae minute, curved, black, those on labellae more prominently outstanding. Palpi short, about one-fifth as long as proboscis; vestiture of blackish-brown scales and moderate black setae. Antennae filiform, the joints subequal, rugose, pilose, black; second joint a little swollen before middle, its basal two-thirds pale; tori subspherical, with a cup-shaped apical excavation, luteous, brown on inner side; hairs of whorls moderate, sparse, black. Clypeus rounded subtriangular, with a slight median groove, depressed, dark brown, nude. Eyes black. Occiput dark brown, clothed with flat appressed scales, except on median line, where there are narrow curved ones, lustrous pale yellow shading to an indistinct brown spot on the sides, the erect forked scales well back on the nape pale, small and poorly differentiated; bristles along margins of eyes black, a pale-yellow tuft projecting forward between the eyes.

Prothoracic lobes elliptical, remote dorsally, dark brown, clothed with pale-yellow scales and black bristles. Mesonotum dark brown, clothed with narrow curved scales, dark bronzy-brown except a narrow anterior border and a pair of rather broad longitudinal, pale brassy yellow, subdorsal stripes, broadened posteriorly and becoming confluent upon the antescutellar space. Scutellum trilobate, gray, with pale-yellow scales, each lobe with a group of brown bristles. Postnotum elliptical, prominent, brown, nude. Pleurae blackish, coxae luteous, clothed with patches of flat, triangular white scales and rows of golden bristles.

Abdomen elongate, subcylindrical, somewhat flattened, tapered posteriorly; dorsal vestiture brownish black with faint submetallic luster, a series of lateral, basal, segmental, triangular yellowish-white patches which are continued broadly across the venter, leaving only the narrow apical lateral angles of the ventral segments black; second segment dorsally with patches of brownish black scales and with many fine pale hairs. Cerci black.

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Wings moderate, hyaline; petiole of second marginal cell about half as long as its cell, that of second posterior cell somewhat shorter than its cell; basal cross-vein distant about its own length from anterior cross-vein; scales brown, the outstanding ones narrowly ligulate. Halteres whitish, with pale brown knobs.

Legs moderately long, slender; vestiture dark bronzy-brown; under sides of femora yellowish nearly to tip; knees narrowly white scaled. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis moderate, straight, blackish brown scaled. Palpi exceeding the proboscis by the length of the last joint; end of long joint and last two joints slightly swollen, with abundant long brown hairs; vestiture dark brown without rings, end of long joint black. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, brownish luteous, with narrow black rings on the incrassated origins of the hair-whorls; hairs long, dense, pale brown with yellowish reflection. Coloration similar to the female. Abdomen elongate, depressed, dorsally with narrow pale basal segmental bands, the last segment entirely dark scaled; lateral ciliation long, fine, abundant, pale yellow. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture sparse. Claw formula, 2.1–2.1–1.1.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 30, fig. 201): Side-pieces about three times as long as wide, apical lobe undeveloped, represented by a narrow expansion of the whole margin, basal lobe rounded, hemispherical, small, setose and bearing a long, stout, hooked spine. Clasp-filament slender, uniform with a long articulated terminal spine. Harpes narrow, elliptical, inner margin revolute and thickened, tips sharply pointed and recurved. Harpagones with slender columnar base bearing a ligulate filament which is expanded at the middle and bears a sharp retrose spine. Unci approximate, revolute, forming a slender cone, cleft at tip. Basal appendages small, approximate, bearing four long spines.

Larva, Stage IV (see figure of the entire larva, plate 68).—Head rounded, narrowed before eyes, a notch at insertion of antennæ, the front margin arcuate. Antennæ slender with a small tuft at middle. Mental plate triangular, thick, with a small central tooth and fourteen on each side, the basal ones somewhat more remotely spaced, the last one small. Mandible quadrangular; two filaments before tip; an outer row of cilia from a collar; a row of filaments along outer margin; dentition of four teeth on a process, the first longest; a spine before, a broad filament and six long feathered hairs within; process below elongate, square, obscurely furcate, fringed with hair along outer margin and with a tuft at apex; basal angle moderate; four hairs within; a row of long ones at base. Maxilla elongate hemispherical, divided by a suture; inner half hairy, a tuft of long hairs at tip; outer half with two long filaments very near the apex and a spine on the other side; palpus rather long, stout, with five irregular digits at tip. Thorax moderate, the tufts of lateral hairs rather short. Abdomen elongate; lateral hairs on segments 3 to 6 single. Air-tube over twice as long as wide, conically tapered; pecten reaching to beyond middle, evenly spaced, teeth longer outwardly, about twenty in number; a single tuft of about six hairs beyond pecten; single pecten-tooth a long spine with five short basal branches. Lateral comb of eighth segment of about twenty scales in a patch nearly three rows deep; single scale elongate, thorn-shaped, fringed with spinules at base. Anal segment about as long as wide, ringed by the plate; dorsal tuft a hair and brush on each side; ventral brush well developed, confined to barred area; anal gills moderate, ensiform.

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The larvæ live in ground pools of a temporary nature, yet such as do not dry too quickly, such as woodland pools, or edges of swamps. The eggs probably hibernate, and there are probably several broods during the year, eggs hatching when the conditions are favorable. Professor Smith found the larvæ associated with *Psorophora sayi* and *Aëdes sylvestris*. Concerning the habits of the adults he says:

"This is another woodland mosquito, and one which has not, up to the present time, been found in towns or even on porches of buildings surrounded by trees. It has never been found indoors, anywhere. The species breeds in some numbers on the ridge back of South Orange, but none of the specimens taken in that place were referable to this species. Outdoor captures were made July 2d, at Trenton, by Mr. Grossbeck; July 4th and 5th, at Chester, by Mr. Dickerson; July 13th, at Summit; July 17th and 18th, at Deckertown; July 21st and 22nd, at Lake Hopatcong, all by Mr. Grossbeck; August 25th, at Jamesburg, by Mr. Marsh, and September 3d, in the Great Piece Meadow, by Mr. Brehme. All these localities are from the more northern section of the State and none are south of the red shale except the Jamesburg locality. All the collectors report that this mosquito is fierce in its attack, but not one was really bitten. The insects seemed to tackle low—that is, they rarely came above the knees, Mr. Grossbeck being especially emphatic on this point. The result was that these parts, being protected by the clothing, did not suffer, while the insect yet gave an exhibition of its good intentions in the matter."

United States, from Massachusetts to Texas; Mexico and Central America.

Westfield, Massachusetts, July 30, 1903 (F. Knab); South Amherst, Massachusetts, July 10, 1903 (G. Dimmock); Granby, Massachusetts, September 12, 1903 (F. Knab); Chester, New Jersey, September 14 (through J. B. Smith); Plummer's Island, Maryland, July 7 (R. P. Currie); Woodstock, Virginia, August 5, 1904 (F. C. Pratt); Rosslyn, Virginia, September 28, 1904 (T. Pergande); Denison, Texas, June 24, 1904 (H. S. Barber); Sherman, Texas, June 23, 1904 (H. S. Barber); Woodlake, Texas, June 21, 1904 (H. S. Barber); Sierra Madre, State of Chihuahua, Mexico (C. H. T. Townsend); Las Cascadas, Canal Zone, Panama, May 15, 1907 (A. Busck); Tabernilla, Canal Zone, Panama (A. Busck); La Boca, Canal Zone, Panama (A. Busck); Colon, Panama (A. Busck); Pedro Miguel, Canal Zone, Panama (A. H. Jennings).

We have carefully examined the types of *Culex inconspicuus*, which are in very poor condition, and have been able to satisfy ourselves that they are this species. Professor Smith kindly loaned them to us, and also the original slides of the larvæ. The larvæ are in the third stage, not mature, and this, together with some slight exaggeration of the characters which occurs in the drawing (Smith, Rept. on Mosquitoes, 1905, p. 296, fig. 93), accounts for the apparent specific characters shown for the larva. We therefore make the reference to the synonymy positively.

It is possible that the yellow stripes on the mesonotum may vary in width and intensity of color, in which case *Aëdes angustivittatus* may prove to be only a variety of this species. The lateral white abdominal spots of *Aëdes trivittatus* are in some specimens extended dorsally to form basal segmental bands.

AËDES ANGUSTIVITTATUS Dyar & Knab.

Aëdes angustivittatus Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 9, 1907.
Aëdes angustivittatus Theobald, Mon. Culic., v, 485, 1910.

ORIGINAL DESCRIPTION OF AËDES ANGUSTIVITTATUS:

Proboscis brown; palpi entirely dark; head with a narrow pale margin behind the eyes and the vertex broadly pale scaled; thorax brown with two narrow longitudinal golden yellow stripes extending the entire length, connected at the front

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margin by a narrow transverse stripe of the same color. In front of the base of the wing are many pale golden hairs. Pleura pale scaled. Abdomen black above, with light lateral patches at the front angles of the segments, beneath creamy white, segments with a narrow black margin behind. Legs dark, unbanded, the femora pale beneath and at base. All tarsal claws toothed in the female.

25 specimens, Port Limon, Costa Rica; Zent, 20 miles from Port Limon; Rio Aranjuez, near Puntarenas, Costa Rica (F. Knab); Bluefields, Nicaragua (W. F. Thornton).

Type.—Cat. no. 10140, U. S. Nat. Mus.

Nearly allied to *Aëdes trivittatus* Coquillett, but the golden thoracic lines are narrower.

DESCRIPTION OF FEMALE OF AËDES ANGUSTIVITTATUS (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderately long and slender, subcylindrical; labellæ conically tapered; vestiture brownish-black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth as long as the proboscis; vestiture of blackish-brown scales and moderate black setæ. Antennæ filiform, the joints subequal, rugose, pilose, black; second joint a little swollen before middle, its base pale; tori subspherical, with a cup-shaped apical excavation, luteous, brown on inner side; hairs of whorls moderate, sparse, black. Clypeus rounded subtriangular, short, convex, dark brown, nude. Eyes black. Occiput dark brown, clothed with flat appressed scales, except narrowly on the median line, where there are narrow curved ones, pale yellow shading to brown on the sides, sometimes forming a distinct patch, small and poorly differentiated erect forked scales well back on the nape, pale in the middle, black laterally; bristles along margins of eyes black, a tuft projecting forward between the eyes pale yellow.

Prothoracic lobes elliptical, remote dorsally, dark brown, clothed with pale yellowish scales and black bristles. Mesonotum dark brown, clothed with narrow curved scales, dark bronzy-brown except a narrow anterior border and a pair of slender, longitudinal subdorsal golden yellow stripes, widened posteriorly and bordering the antescutellar bare space. Scutellum trilobate, gray, with pale yellow scales, each lobe with a group of black bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ blackish, coxæ luteous, clothed with patches of flat triangular white scales and rows of golden bristles.

Abdomen subcylindrical, somewhat flattened, tapered posteriorly; dorsal vestiture brownish-black with submetallic luster, a series of large lateral basal segmental triangular yellowish-white patches; first segment with brownish black scales and many fine pale hairs; venter pale ocherous yellow scaled, the segments with narrow, dark apical bands. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell over half as long as its cell, that of second posterior cell somewhat shorter than its cell; basal cross-vein distant about its own length from anterior cross-vein; scales deep brown, the outstanding ones broadly linear. Halteres whitish, with brown knobs.

Legs moderate, the vestiture blue-black the under sides of the femora yellowish nearly to the tip. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4 mm.

Life history and habits unknown.

Central America.

Port Limon, Costa Rica, September 28, 1905 (F. Knab); Puntarenas, Costa Rica, September 13, 1905 (F. Knab); Bluefields, Nicaragua (W. F. Thornton); Tabernilla, Canal Zone, Panama, May 13, 1908 (A. H. Jennings).

Aëdes angustivittatus might be mistaken for a variety of *Aëdes trivittatus*, differing in the width of the thoracic yellow stripes and their richer color. We have no knowledge of the male genitalia nor of the larvæ, but the difference in

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the vestiture of the occiput indicates a distinct species. The median line of narrow scales is distinctly broader, while the scales on either side of it are usually very extensively black.

AËDES OBTURBATOR Dyar & Knab.

Culex trivittatus Coffin (not Coquillett), in Shattuck, The Bahama Ids., 289, 1905.
Aëdes obturbator Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 9, 1907.
Aëdes obturbator Theobald, Mon. Culic., v, 485, 1910.

Original Description of Aëdes obturbator:

Proboscis brown; palpi dark; head behind the eyes pale yellowish; at the sides a dark spot; thorax bronzy yellow, a median dark brown stripe running the whole length, the lateral margin brown with irregular outline; the scutellum is silvery; pleura pale scaled. Abdomen black above, with white basal bands; beneath entirely pale. Legs dark, unbanded, the femora pale beneath. All tarsal claws toothed in the female.

22 specimens, Tarpon Bay, Bahama Islands (T. H. Coffin).

***Type.*—Cat. no. 10141, U. S. Nat. Mus.**

Allied to *Aëdes euratus* Grabham, but the thorax has a brown median band.

Description of Female of Aëdes obturbator (Male and Larva Unknown):

Female.—Proboscis rather slender, subcylindrical; labellæ conically tapered; vestiture brownish black; setæ minute, black, those on labellæ more prominently outstanding. Palpi short, one-sixth as long as the proboscis; vestiture of blackish-brown scales and moderate black setæ. Antennæ filiform, the joints subequal, rugose, pilose, black; second joint a little swollen towards middle, its base very pale; tori subspherical, with a cup-shaped apical excavation, pale yellow; hairs of whorls moderate, sparse, black. Clypeus short, rounded triangular, convex, dull brown, nude. Eyes black. Occiput dark brown, clothed with rather broad curved scales over the whole vertex, flat appressed ones on the sides, pale yellow, with a brown-black quadrate patch well down on the sides; a group of erect forked golden scales on the nape; bristles along margins of eyes black, a tuft projecting forward between the eyes pale yellow.

Prothoracic lobes elliptical, remote dorsally, pale luteous, clothed with pale scales and black bristles. Mesonotum dark brown, clothed with narrow curved scales, metallic brownish yellow except a narrow, dark bronzy-brown, median longitudinal stripe, broadened somewhat posteriorly from before antescutellar space. Scutellum trilobate, gray, with pale yellow scales, each lobe with a group of brown setæ. Postnotum elliptical, prominent, dark brown, with yellow lateral margins, nude. Pleuræ pale luteous, with large dark brown spots, coxæ luteous, clothed with patches of flat, triangular white scales and rows of golden bristles, the scales over the large, elongate dark brown spot along the humeral angles dull brown.

Abdomen subcylindrical, flattened, tapered posteriorly; dorsal vestiture brownish black, a series of basal, segmental, narrow, dull white bands becoming broader at sides; first segment with dull black scales and many fine, pale setæ; venter dull white, the last two segments with black apical bands. Cerci black.

Wings rather broad, hyaline; petiole of second marginal cell less than half as long as its cell, that of the second posterior cell considerably shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales dark brown, outstanding ones broadly linear. Halteres whitish, with brown knobs.

Legs slender, moderately long; vestiture dull bronzy-brown; under sides of femora yellowish nearly to tips; knees pale scaled. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4 mm.

Life history and habits unknown.

Bahama Islands, West Indies.

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Tarpum Bay, Eleuthera, 1903 (T. H. Coffin).

The specimens of *Aëdes obturbator* are stated to have been captured in the woods on July 7.

AËDES DUPREEI (Coquillett) Dyar & Knab.

Culex dupreei Coquillett, Can. Ent., xxxvi, 10, 1904.
Culex dupreei Smith, Ent. News, xv, 49, 1904.
Culex dupreei Felt, Bull. 79, N. Y. State Mus., 334, 1904.
Culicada dupreei Felt, Bull. 79, N. Y. State Mus., 391c, 1904.
Culex dupreei Smith, Bull. 171, N. J. Agr. Exp. Sta., 38, 1904.
Culex dupreei Smith, N. J. Agr. Exp. Stat., Rept. Mosq., 281, 1905.
Grabhamia dupreei Dyar, Proc. Ent. Soc. Wash., vii, 48, 1905.
Culicada dupreei Felt, Bull. 97, N. Y. State Mus., 447, 479, 1905.
Aëdes dupreei Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 195, 1906.
Ochlerotatus dupreei Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 18, 1906.
Ochlerotatus dupreei Dyar, U. S. Dept. Agr., Bur. Ent., Circ. 72, 4, 1906.
Culex dupreei Howard, Osler's Modern Medicine, i, 377, 1907.
Protoculex ? dupreei Theobald, Mon. Culic., iv, 466, 1907.
Aëdes dupreei Thibault, Proc. Ent. Soc. Wash., xii, 18, 1910.
Protoculex (?) dupreei Theobald, Mon. Culic., v, 402, 1910.
Aëdes dupreei Morse, Ann. Rept. N. J. State Mus., 1909, 719, 1910.

ORIGINAL DESCRIPTION OF CULEX DUPREEI:

Female. Near *serratus*, but much smaller, the white-scaled median vitta of the mesonotum broader, widening posteriorly where it is wider than the brown lateral portion, etc. Black, the bases of antennæ, lower part of pleura, the metanotum, basal portion of venter, coxae, and femora, yellowish; scales of palpi black, those of occiput white, and with a spot of black ones each side; scales of middle of mesonotum white, those on the sides brown, on the pleura and scutellum white; scales of abdomen brown, those on the basal angles of the segments and on the venter white; scales of femora yellowish, those on front side of first two pairs, and on apical portion of upper side of hind ones, chiefly brown, those of tibiae and tarsi brown; tarsal claws toothed; wings hyaline, lateral scales of the veins narrow and linear, petiole of first submarginal cell about one-third the length of that cell, hind cross-vein about its length from the small; length, slightly over 2 mm.

Male.—Colours as in the female, but the mesonotum nearly covered with white scales; penultimate joint of palpi considerably dilated, the last joint narrow, front and middle tarsi with one tooth under one of the claws, none under the other, petiole of first submarginal cell nearly as long as the cell.

Baton Rouge, Louisiana.—A specimen of each sex received from Mr. J. W. Dupree, after whom the species is named. Type No. 7340, U. S. National Museum. Mr. Dupree writes that the eggs and larvæ of this species are very distinct from those of *serratus*. A small series bred by Dr. J. B. Smith, at New Brunswick, New Jersey, has also been examined.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES DUPREEI:

Female.—Proboscis rather short, subcylindrical, uniform; labellæ conically tapered; vestiture black; setæ curved, minute, black, those on labellæ more prominently outstanding. Palpi short, one-fifth as long as the proboscis, black, with sparse bristly setæ. Antennæ filiform, the joints subequal, distal ones slightly longer, rugose, blackish, pilose; second joint slightly thickened, pale on basal two-thirds; tori subspherical, with a cup-shaped apical excavation, pale brown, brownish-black on inner side; hairs of whorls sparse, rather long, black. Clypeus short, broad, rounded in front, convex, black, nude. Eyes black. Occiput dark brown; vestiture of broad, flat scales, a narrow median line of narrow scales on vertex, silvery-white in the middle and along margins of eyes, black laterally; some erect, pale, forked scales on the nape; setæ along margins of eyes black, those projecting between the eyes pale.

Prothoracic lobes elliptical, remote dorsally, dark brown, similarly colored to sides of mesonotum, with dark setæ. Mesonotum dark brown, clothed with long, narrow, curved scales, broadly silvery-white in a median stripe from anterior edge over the antescutellar space, bronzy-brown along sides of disk. Scutel-

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lum trilobate, clothed with silvery-white scales, each lobe with a group of brownish-black bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ pale, with brown spots, coxæ pale, clothed with patches of elliptical flat white scales and rows of pale setæ.

Abdomen subcylindrical, tapering posterior; dorsal vestiture of brownish black scales with faint metallic reflection, with large lateral, basal, segmental, triangular white patches; first segment with a patch of dark scales and many fine, pale hairs; venter wholly whitish scaled. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell about half as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein about its own length distant from anterior cross-vein; scales wholly dark brown, outstanding ones narrowly ligulate, broader and denser towards tip of wing. Halteres whitish, with dark knobs.

Legs slender, moderately long; vestiture dull bronzy brown with a bluish reflection; femora pale whitish beneath, except at tip. Claw formula, 1.1–1.1–1.1.

Length: Body about 3.5 mm.; wing 3 mm.

Male.—Proboscis rather long and slender. Palpi exceeding the proboscis by nearly the length of the last joint; end of long joint and last two joints slightly swollen and with abundant long brown hairs; vestiture entirely bronzy brown. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, narrowly black-ringed at insertion of hair-whorls, pale beyond; hairs long, dense, lustrous brown. Coloration similar to the female, the dorsal silvery area of the thorax broader, practically covering the disk. Abdomen elongate, depressed, densely hairy laterally. Markings of the abdominal segments silvery, forming broad bands across the dorsum. Wings slightly narrower than in the female, the stems of the fork-cells much longer, the vestiture sparser. Claw formula, 2.1–2.1–1.1.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 31, fig. 208): Side-pieces over twice as long as wide, rounded at tip, apical lobe absent, basal lobe small, rounded, prominent, densely setose, with a long stout spine within. Clasp-filament slender, slightly swollen in middle, with a long articulated terminal spine. Harpes narrowly elliptical, concave, inner margin thickened and revolute, tip pointed and recurved. Harpagones with a slender columnar base bearing a short seta on inner side and a long, very narrow, articulated terminal filament with a pointed tip. Unci approximate, revolute, forming a large basal cone. Basal appendages small, rather remote, bearing three stout spines at tip.

Larva, Stage IV (plate 125, fig. 435).—Head rounded, narrowed before eyes, a slight notch at insertion of antennæ, front margin arcuate. Antennæ cylindrical, slender, uniform, sparsely spined; a single hair at middle; four spines of irregular length at tip and a digit on a pedestal. Upper pair of dorsal head-hairs single, lower pair double, ante-antennal tuft three-haired. Mental plate rounded triangular; teeth slightly radial, uniform, sixteen on each side, the basal one detached and smaller. Mandible quadrangular, rather short, slightly spined outwardly near base; two filaments near tip; an outer row of cilia; twelve filaments on outer edge; dentition of four teeth on a process, the first and fourth longer; two filaments at base, short teeth without, a broad plate and four hairs within; process below furcate, with patches of hair; basal angle moderate; three stout hairs within; a row of five hairs at base. Maxilla hemispherical, narrowed without, divided by a suture; inner half sparsely hairy, a tuft of hairs at tip; outer half very sparsely hairy, two large filaments at the suture near the tip; palpus short and stout, with four small digits, of which one is a mere rudiment. Thorax rounded, wider than long; hairs moderate.

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Abdomen moderate, anterior segments shorter; lateral hairs double on first segment, single on the succeeding ones; tracheal tubes very narrow, also narrow within the breathing-tube. Air-tube slender, slightly bulging on basal half, three and a half times as long as wide; pecten of few teeth, coarse but even, occupying basal third, followed by a single ample hair-tuft towards middle; single tooth a stout spine, wide at base, with three basal teeth. Lateral comb of eighth segment of seven or eight scales in a row; single scale long, tapered to a point, fringed with spinules the whole length. Anal segment much broader than long, ringed by the plate; dorsal tuft a long hair and brush on each side; ventral brush well developed, situated on the posterior aspect of the segment, not exceeding the barred area; anal gills very long, six or more times as long as the segment, gradually tapering to a sharp point, partially segmented by a series of slight constrictions and with a stout distinct central trachea.

The larvæ live in temporary ground-pools resulting from rains. The eggs probably hibernate, but they do not hatch in the snow-water of early spring. The larvæ appear at intervals after rains, eggs hatching whenever the conditions are favorable. The females do not appear to be attracted by man and perhaps do not suck blood. Professor Smith says that the larvæ were first found in a woodland pool. They were at once recognized as distinct by the unusually long anal gills, the very small breathing tube and the habit of remaining close to the bottom.

"While in confinement the wrigglers never rose voluntarily to the surface, and when disturbed sailed rather than wriggled upward, descending immediately when quiet was restored. So inconspicuous and transparent are they, that a jar containing them would be set aside as empty unless critically examined, and this, together with their habit of hiding among leaves at the bottom of pools, renders them difficult to secure. * * The record indicates continuous breeding from the middle of July to the end of September."

Mr. Knab in Costa Rica found the larvæ associated with *Psorophora posticatus, Aëdes serratus,* and *Psorophora cilipes.*

Southeastern United States to Central America; Trinidad, West Indies.

New Brunswick, New Jersey, August 1 (through J. B. Smith); Washington, District of Columbia, June 15, 1903 (W. V. Warner); Baton Rouge, Louisiana (J. W. Dupree); Scott, Arkansas, July 11, 1908 (J. K. Thibault, Jr.); Las Loras, near Puntarenas, Costa Rica, September 9, 1905 (F. Knab); Trinidad, West Indies, June, 1905 (A. Busck).

Aëdes dupreei is widely distributed, but rare and difficult to find, so that unless careful collecting is done it is not taken.

AËDES INFIRMATUS Dyar & Knab.

Culicelsa confirmatus Dyar (not Lynch Arribálzaga), Journ. N. Y. Ent. Soc., xiii, 186, 1905.
Aëdes infirmatus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 190, 197, 1906.
Aëdes infirmatus Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 5, 1906.
Aëdes infirmatus Thibault, Proc. Ent. Soc. Wash., xii, 18, 1910.

ORIGINAL DESCRIPTION OF AËDES INFIRMATUS:

With the characters given in the table. The specimens were obtained by Dr. Dupree at Baton Rouge, La., and determined by Mr. Coquillett as "*Culex confirmatus* Arrib.," a determination which appears to us too improbable to accept.

The following is an abstract of the table:

1.	Air tube with the tuft beyond the pecten	8
8.	Pecten of the air tube with evenly spaced teeth	13
13.	Comb scales more numerous to many in a patch	21
21.	Anal segment ringed by the plate	22
22.	Air tube twice as long as wide or less, pecten of 12-14 teeth	26
26.	Scales of comb feathered on the sides with central thorn; pecten reaching half the length of tube; body glabrous	*infirmatus*

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DESCRIPTION OF FEMALE, MALE, LARVA AND EGG OF AËDES INFIRMATUS:

Female.—Proboscis moderate, subcylindrical, uniform; labellæ conically tapered; vestiture black; setæ curved, minute, black, those on the labellæ more prominently outstanding. Palpi short, about one-fifth as long as the proboscis; vestiture black, with sparse bristly setæ. Antennæ filiform, the joints subequal, distal ones slightly longer, rugose, blackish, pilose; second joint but slightly thickened, pale at base; tori subspherical, with a cup-shaped apical excavation, pale yellow, brownish-black on inner side; hairs of whorls sparse, rather long, black. Clypeus rounded triangular, convex, with a slight median groove, black, nude. Eyes black. Occiput dark brown: vestiture of narrow scales on the vertex, broad ones on the sides, silvery-white in the middle and along margins of eyes, blackish-brown laterally; many upright, broad, pale scales on the nape; setæ along margins of eyes black, those projecting between eyes pale.

Prothoracic lobes elliptical, remote dorsally, dark brown, similarly colored to sides of mesonotum, with small bronzy-brown scales and dark setæ. Mesonotum dark brown, clothed with narrow curved scales, silvery-white in a broad median stripe from anterior edge to posterior fourth, deep bronzy-brown on sides of disk and behind, paler about the antescutellar space. Scutellum trilobate, clothed with silvery scales, each lobe with a group of brownish-black bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ and coxæ pale, clothed with patches of elliptical, flat white scales and rows of pale setæ.

Abdomen subcylindrical, tapering posteriorly; dorsal vestiture of brownish black scales with a slight blue reflection, with lateral, basal, segmental, triangular white patches; first segment with a patch of dark scales and many fine pale hairs; venter wholly whitish scaled. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell about half as long as its cell, that of second posterior cell somewhat shorter than its cell; basal cross-vein less than its own length distant from anterior cross-vein; scales wholly brownish-black, outstanding ones narrowly ligulate, denser and slightly broader towards tip of wing. Halteres whitish, with dark knobs.

Legs slender, moderately long; vestiture dull bronzy-brown with a bluish reflection; femora pale whitish beneath nearly to their apices. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis moderately long and slender, straight, black scaled. Palpi exceeding the proboscis by nearly the length of the last joint, uniformly dark brown scaled; end of long joint and the last two joints slightly swollen and with numerous long black hairs. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, narrowly black-ringed at insertions of hair-whorls, pale beyond; hairs long, dense, black shading to brown. Coloration similar to the female. Abdomen elongate, depressed; lateral ciliation abundant, fine, pale; lateral segmental spots large, tending to form narrow basal bands dorsally; eighth segment white scaled above. Wings somewhat narrower than in the female, the stems of the fork-cells much longer, the vestiture sparse. Claw formula, 2.1–2.1–1.1.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 29, fig. 200): Side-pieces over twice as long as wide, rounded at tip; apical lobe small, continued narrowly two-thirds to base; basal lobe small, obtusely rounded, densely setose, with a long stout spine within. Clasp-filament slender, slightly swollen medianly, with a long articulated terminal spine. Harpes elliptical, concave, inner margin thickened and revolute, tip pointed and recurved. Harpagones with a slender columnar base bent at outer third, minutely pilose; a long articulated terminal filament, narrowly

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ligulate, with a sharp retrose branch beyond. Unci approximate, revolute, the middle forming a small basal cone. Basal appendages small, approximate, bearing three stout spines at tip.

Larva, Stage IV.—Head rounded, narrowed before eyes, a notch at insertion of antennæ, front margin arcuate. Antennæ cylindrical, slender, nearly uniform, sparsely spined all over; tuft small, before middle; two stout spines at tip, a small spine, a sessile digit and one on a pedestal. Eyes large, transverse. Both pairs of dorsal head-hairs single, ante-antennal tuft multiple. Mental plate rounded triangular, the central tooth scarcely larger than the others, of which there are sixteen on a side, the last two detached. Mandible quadrangular; two filaments before tip; an outer row of stout cilia; a row of thirteen filaments on front margin; dentition of four teeth on a projection, the first blunt and widened at tip, the fourth long; filaments before and within; two double teeth at base; process below furcate, with patches of hair; an angle below; four long hairs within and four longer ones at base. Maxilla hemispherical, divided by a band-shaped suture; inner half hairy, the hairs in tufts inwardly, the tufts on pedicel on the edge, a long tuft at tip; inner half with small hairs near the palpus, the two filaments situated near tip; palpus three times as long as wide, rather large, constricted in the center, two small digits and two minute appressed ones. Thorax rounded, wider than long; hairs abundant, not long, the subdorsal prothoracic hairs single. Abdomen stout, anterior segments shorter; hairs moderate, the lateral hairs double on first two segments, single on third to sixth; secondary hairs short, in tufts; tracheal tubes broad, band-shaped, expanded into large bladders in the thorax. Air-tube stout, slightly tapered on outer half, three times as long as wide; pecten reaching to middle, the teeth evenly spaced, followed by a single hair-tuft; single pecten-tooth a long spine with six branches at base. Lateral comb of eighth segment of many scales in a triangular patch; single scale elongate triangular, with a long apical spinule half as long as body of the scale and a fringe of smaller spinules. Anal segment longer than wide, ringed by the plate; dorsal tuft a brush and hair on either side; a single lateral hair; ventral brush well developed, confined to barred area; anal gills moderate, ensiform, longer than the segment.

Egg (plate 146, fig. 680).—Broadly fusiform, black, the sculpture of rhomboidal reticulations.

The larvæ live in temporary ground-pools, particularly the edges of marshes. The eggs probably hibernate and hatch after rains during the summer, and a number of generations succeed each other during the year. The eggs are laid singly. Mr. Thibault says of this mosquito:

"Locally abundant at intervals. Mostly after rains. In woods and thickets. Sometimes about dwellings. Does not enter houses extensively. A summer mosquito. Taken at about same time and in same places as *tormentor*. A persistent biter; quite annoying where it is plentiful."

Gulf States.

New Orleans, Louisiana, July 18, 1901 (G. E. Beyer); New Orleans, Louisiana, 1903 (L. G. Gill); Baton Rouge, Louisiana (J. W. Dupree); Scott, Arkansas, August 31, 1908 (J. K. Thibault, Jr.); West Tampa, Florida, March 18, 1905 (H. G. Dyar); Bartow, Florida, March 20, 1905 (A. N. Caudell).

AËDES SCAPULARIS (Rondani) Pazos.

Culex scapularis **Rondani, Studi ent., Baudi e Truqui, 109, 1848.**
Ochlerotatus confirmatus **Lynch-Arribálzaga, Rev. Museo de la Plata, ii, 146, 1891.**
Culex confirmatus **Giles, Handb. Gnats or Mosq., 320, 1900.**
Culex confirmatus **Theobald, Mon. Culic., ii, 42, 1901.**
Culex confirmatus **Giles, Handb. Gnats or Mosq., 2 ed., 443, 1902.**

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Culex confirmatus Taylor, Rev. Med. Trop., iv, 118, 1903.
Culex confirmatus Theobald, Mon. Culic., iii, 191, 1903.
Culex confirmatus Parker, Beyer & Pothier, Bull. 13, Yell. Fev. Inst. (Publ. Health & Mar.-Hosp. Serv.), 40, 1903.
Culex confirmatus Lutz in Bourroul, Mosq. do Brasil, 41, 72, 1904.
Culex confirmatus Pasos, Bull. Soc. Ent. France, 1904, 134, 1904.
Culex scapularis Blanchard, Les Moustiques, 335, 1905.
Culicada confirmatus Felt, Bull. 97, N. Y. State Mus., 476, 1905.
Culex confirmatus Grabham, Can. Ent., xxxvii, 405, 1905.
Culex confirmatus Theobald, Gen. Ins., Dipt., 26 fasc., 26, 1905.
Culex confirmatus Theobald & Grabham, Mosq. or Culic. Jamaica, 25, 1905.
Culex confirmatus Goeldi (in part), Os Mosq. no Pará, 93, 1905.
Aëdes euplocamus Dyar & Knab (in part), Proc. Biol. Soc. Wash., xix, 162, 1906.
Aëdes hemisurus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 190, 199, 1906.
Ochlerotatus confirmatus Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 19, 1906.
Aëdes indolescens Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 11, 1907.
Culex scapularis Autran, Anal. Dep. Nac. Hig., xiv, 20, 1907.
Culex confirmatus Aiken, Brit. Guiana Med. Annual, 1906, 68, 1907.
Aëdes hemisurus Pasos, Rev. de Med. Trop., Habana, i, 99, 1908.
Culex confirmatus Peryassú, Os Culicid. do Brasil, 46, 65, 188, 1908.
Aëdes scapularis Pasos, Sanidad y Ben., ii, 47, 322, 1909.
Leucomyia scapularis Theobald (in part), Mon. Culic., v, 315, 1910.
Aëdes indolescens Theobald, Mon. Culic., v, 485, 1910.

ORIGINAL DESCRIPTION OF CULEX SCAPULARIS:

Long. mill. 4.

♀. Fuscus. *Antennae* articulo primo luteo-fulvo.—*Proboscis* picea apice nigricante.—*Oculi* nigricantes fasciis irregularibus albidis sub-argenteis (Semper ? Etiam in vivo?).—*Caput* postice albo-tomentosum.—*Thorax* dorso antice albo tomento tecto, postice piloculo, pilis rufescentibus brevibus, et fuscis longioribus: pleuris fusco-rufescentibus albo-maculatis.—*Scutellum* et *Metathorax* fusco-rufescentia.—*Halteres* stipite fusco albicante capitulo satis fusciore.—*Abdomen* dorso nigricante fasciola longitudinali intermedia a segmento secundo ad anum pallida, in ultimis segmentis magis perspicua et paulo latiore: segmentis omnibus ad unumquodque latus macula trigona albo-pollinosa; ventre albo-pollinoso et squamoso.—*Pedes* latere anteriori fusci et nigricantes, posteriori lutescentes et sub-albicantes, tarsis fuscioribus.—*Aloe* areolis sublimpidis, quarta et septima exterioribus aequidistantibus a basi alarum.

ORIGINAL DESCRIPTION OF OCHLEROTATUS CONFIRMATUS:

Fuscus; capite posticè griseo-sericeo-tecto; mesonoto antice plus dimidio argenteo-sub-aurato-sericeo vestito, posticè fusco-cervino-squamulato, fuscoque piloso; abdomine suprà nigro-fusco leviter violaceo-vergente, segmentis basi albo-sericeis, subtus griseo-sericeo; antennis, palpis, geniculis tibiarum apice tarsisque fuscis. Proboscis apice fusca basin versus dilutior. Pedibus pallide flavidis.—Long. 5 millim. (♀).

Antennae obscure fuscae sat longe verticillatim fusco-pilosae, *torulo* et articulo primo basin versus testaceis. *Caput* antice nudum obscure piceum, postice griseo-sericeo leviter argenteo-squamatum, fusco pilosum, subtus piceum. *Oculi* in vivis viridi, post-mortem griseo-olivacei. *Proboscis* fusco-testacea, apicem versus fusco-picea. *Palpi* obscurè picea fere nigri. *Thorax* suprâ antrorsumque plus dimidio dense apresse griseo-argenteo-, leviter sub-aurato-sericeo-squamulatus, postice et utrinque summo margine obscure cervino-squamatus, anticé pilis destitutus videtur sed posticè sat longe denseque fusco-pilosus. *Scutellum* obscurè cervinum fusco-pilosum. *Pleurae* anticae piceae, mediae et postice piceae at griseo sericante sub-argenteo micantes. *Alae* hyalinae sat dense fusco-squamatae. *Halteres* pallidi, capitulo leviter testacei. Pedes pallidè flavicantes, tarsi antici leviter infuscati; geniculis mediis posticisque tibiarum apice tarsisque dilute fuscis. *Abdomen* suprâ nigro-fuscum, secundum lucem ad violaceum vergens, transversim albo-sericeo-fasciatum, subtus griseo-sericeo tectum.

Hab. observ.: Prov. Buenos Ayres *in Navarro prope ripas Saladensis fluvius* (F. LYNCH); Chaco *in Formosa* (E. L. HOLMBERG).

Dos hembras, cazadas por mí, en Mayo de 1887 en la Provincia de Buenos Ayres, cerca del Rio Salado, y otras cinco recogidas por el DR. EDUARDO L. HOLMBERG en *Formosa* (Chaco), en las márgenes del Rio Paraguay, son los únicos ejemplares que he visto. Los ejamplares chaqueños son un poco mayores que los bonaerenses. Tambien se asemeja al *C. vittatus* PHIL., pero carece de raya dorsal en el abdómen.

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ORIGINAL DESCRIPTION OF AËDES HEMISURUS:

This is the species figured by Dr. Grabham from Jamaica (Can. ent., xxxvii, 405, 1905) as "*Culex confirmatus* Arrib." We do not believe that the insular form can be conspecific with the one described from the Argentine, especially as it is very different from the one identified as *confirmatus* from the United States. (See *Aëdes infirmatus* above.) We therefore propose a new name.

The following is an abstract of the table:

1.	Air tube with the tuft beyond the pecten	8
8.	Pecten of the air tube with evenly spaced teeth	13
13.	Comb scales more numerous to many in a patch	21
21.	Anal segment ringed by the plate	22
22.	Air tube twice as long as wide or less, pecten of 12-14 teeth	26
26.	Scales of comb evenly spinulated without central thorn	27
27.	Body pilose	28
28.	Pecten to four-fifths of tube; tuft almost apical	*hemisurus*

ORIGINAL DESCRIPTION OF AËDES INDOLESCENS:

Proboscis bronzy brown; head behind the eyes dull brown scaled, the margins of the eyes and a median line silver scaled; thorax bronzy brown, a broad silver patch on the disk, broadest at the middle and covering the anterior two-thirds of the thorax; abdomen black above, a pale bronzy longitudinal median line; beneath white, with triangular black spots at the angles of the segments. Legs dark, the hind femora mostly white, with a black apical ring; hind tibiae with a pale longitudinal stripe on the under side, stopping short of the apex. Wing veins brown scaled. Claws of the female toothed.

30 specimens, Cayamas, Cuba (E. A. Schwarz); Havana, Cuba (J. W. Taylor); Santo Domingo, West Indies (A. Busck).

Type.—Cat. no. 10249, U. S. Nat. Mus.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES SCAPULARIS:

Female.—Proboscis moderate, subcylindrical, uniform; labellæ conically tapered; vestiture black; setæ curved, minute, black, those on labellæ more prominently outstanding. Palpi short, one-fifth as long as the proboscis; vestiture black, with sparse bristly setæ. Antennæ filiform, the joints subequal, the distal ones slightly longer, rugose, blackish, pilose; second joint swollen before middle, pale basally; tori subspherical, with a cup-shaped apical excavation, yellow, brownish-black on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded in front, convex, depressed on disc, black, nude. Eyes black. Occiput dark brown; vestiture of narrow, curved scales on the center of vertex, broad ones on the sides, silvery-white with a yellow tint in the middle and along margins of eyes, a large blackish-brown lateral spot; a group of golden-yellow, upright, forked scales on the nape; setæ along margins of eyes black, those projecting between eyes pale.

Prothoracic lobes elliptical, remote dorsally, dark brown, similarly colored to sides of mesonotum, with minute silvery scales and dark setæ. Mesonotum dark brown, clothed with narrow, curved scales, a large roundedly hexagonal silvery-white patch medianly on anterior two-thirds, dark brown on the sides of disk and behind, yellowish-silvery around antescutellar space. Scutellum trilobate, clothed with yellowish-silvery scales, each lobe with a group of brownish bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ blackish, coxæ brown, clothed with patches of elliptical flat white scales and rows of pale setæ.

Abdomen subcylindrical, depressed, tapering posteriorly; dorsal vestiture of brownish-black scales with a slight blue reflection, with large lateral, basal, segmental, triangular white patches, each segment with a median basal patch of sordid-white scales, the patches becoming more elongate on the posterior segments and forming a median stripe on the seventh one; first segment with brownish-black scales and many fine pale hairs; venter wholly yellowish-white scaled. Cerci black.

Wings rather broad, hyaline; petiole of second marginal cell about half as long as its cell, that of second posterior cell shorter than its cell; basal cross-

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vein distant about its own length from anterior cross-vein; scales wholly brownish-black, the outstanding ones narrowly ligulate, those on forks of second vein denser and slightly broader. Halteres whitish, with dark knobs.

Legs slender, moderately long; vestiture dull bronzy-brown with a bluish reflection; femora white beneath except at extreme tips; fore and mid tibiæ yellowish-white beneath in their entire length, hind tibiæ yellowish-white mesially beneath, the bases and apices broadly black; tarsi unicolorous, those of hind legs brassy yellowish beneath nearly to tip. Claw formula, 1.1–1.1–1.1.

Length: Body 4 mm.; wing 3.5 mm.

Male.—Proboscis straight, moderately long and slender, black scaled. Palpi exceeding the proboscis by half the length of the last joint; last two joints and apex of long joint slightly swollen and with abundant long blackish hairs; vestiture brownish-black with blue luster. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, narrowly black ringed at insertions of hair-whorls, pale beyond; hairs long, dense, dark brown with yellow luster. Coloration similar to the female, the silvery area on the mesonotum more extensive. Abdomen elongate, depressed, the lateral spots enlarged, tending to form basal segmental bands dorsally, the last segment white scaled, with a narrow black apical margin; medio-dorsal spots absent; venter pure white with large latero-apical black spots; lateral ciliation long, fine, regular, pale yellowish. Wings somewhat narrower than in the female, the stems of the fork-cells longer, the vestiture sparse. Claw formula, 2.1–2.1–1.1.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 29, fig. 199, and plate 30, fig. 202): Side-pieces over twice as long as wide, rounded at tip; apical lobe broad, not prominent; basal lobe small, rounded, densely setose, with a long stout spine within. Clasp-filament slender, slightly swollen in middle, with a long articulated terminal spine. Harpes narrowly elliptical, concave, inner margin thickened and revolute, tip pointed. Harpagones with a slender columnar base bearing a short seta on inner side at base and a long articulated terminal filament, widened in the middle and bearing a short retrose spine. Unci approximate, revolute, forming a short basal cylinder. Basal appendages small, approximate, bearing three stout spines at tip.

Larva, Stage IV (plate 120, fig. 414).—Head rounded, widest through eyes, narrowed anteriorly, rounded in front. Antennæ moderate, slender, uniform, spinulose, the tuft small, situated before the middle. Both pairs of dorsal head-hairs single, ante-antennal tuft multiple. Body with the skin coarsely pilose. Lateral comb of eighth abdominal segment of many scales in a narrow patch, each scale evenly spinulated, without central thorn. Air-tube about two and a half times as long as wide, slightly tapered beyond middle; pecten of fourteen long, evenly spaced teeth reaching beyond middle of tube, followed by a single tuft of about eight hairs. Anal segment about as long as wide, ringed by the plate; dorsal tuft a long hair and a tuft on each side; ventral brush well developed, confined to the barred area; anal gills long, about twice as long as the segment, tapering gradually towards the tips.

The larvæ live in temporary ground-pools or marshes. Mr. Knab found the larvæ in temporary pools of muddy water in stream-beds, where they were associated with other species occurring under these conditions. The eggs pass the dry season, and there are several hatchings in the year. The Rev. Mr. Aiken says that the occurrence of this mosquito is conditioned only by the opportunities for breeding and that the adults frequent the breeding-places. He says:

"At a small pool to the north of All Saints' manse we invariably found these mosquitoes active so long as water remained; and on one or two occasions when we found the pool dry, on turning over decaying leaves lying in the bottom, we

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disturbed numbers of these flies, when not one was to be seen ranging in the surrounding bush."

Dr. Grabham found the larvæ in stagnant, algæ-containing pools of permanent water. The larval stages lasted about eight days, the pupal stage 36 to 48 hours. The insects generally emerged between 5 and 7 p. m. The adults appear to be especially active during the afternoon and early evening. Dr. Goeldi also found this to be a day-flying mosquito. He has observed and figured the eggs. They are fusiform, more flattened on one side, black, granular, with an annular colorless cushion at the micropyle. Dr. Goeldi says that the adults were noticed in Pará mostly in the dry season, and that they frequent dry fields and gardens where water is present in ditches or natural depressions. It loves the light, and is most troublesome during the hottest hours with burning sun.

Tropical America, including the Antilles.

Vera Cruz, Mexico (D. L. Crawford); Frontera, State of Tabasco, Mexico, February 19 (C. H. T. Townsend); Córdoba, Mexico, June 30, 1905 (F. Knab); Santa Lucrecia, Mexico, June 23, 1905 (F. Knab); Georgetown, British Guiana, June 1, 1906 (E. D. Rowland); Berbice, British Guiana (J. Aiken); Guayaquil, Ecuador (F. Campos); Trinidad, June, 1905 (A. Busck); San Antonio de los Baños, Cuba (J. H. Pazos); Cayamas, Cuba, May (E. A. Schwarz); Santo Domingo, August, 1905 (A. Busck); Kingston, Jamaica (M. Grabham); São Paulo, Brazil (A. Lutz). Reported also from Province of Buenos Aires and Formosa, Chaco Territory, Argentine Republic (Lynch Arribálzaga); Chile (Blanchard); Rio de Janeiro, State of Amazonas, State of Pará, Bahia, State of Minas Geraes, State of Matto Grosso, Brazil (Peryassú).

This species has been referred to mostly under Arribálzaga's name, but that of Rondani is earlier, and clearly refers to this species. Dr. Grabham figured the larvæ from Jamaica, but so erroneously as to cause Dyar & Knab to propose the name *hemisurus*, under the impression that the larvæ were not those of *scapularis*. The name *hemisurus* must be cited as a synomym, while the characters on which it was founded are fictitious. The name *Aëdes indolescens* was founded upon specimens from Cuba, under the supposition that they had no lateral abdominal spots. This proves to have been an error of observation, and the characters upon which this name was founded are likewise fictitious. *Aëdes euplocamus* is a closely allied species, differing in having the hind tibiæ entirely black, but which has been confused with *scapularis*. Dr. Goeldi figures as the larva and pupa of *Aëdes scapularis* those of *Culex imitator* Theobald (Os mosquitos no Pará, 1905, plate C, figs. 32, 33).

AËDES EUPLOCAMUS Dyar & Knab.

Aëdes euplocamus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 190, 199, 1906.
Aëdes euplocamus Dyar & Knab (in part), Proc. Biol. Soc. Wash., xix, 162, 1906.

ORIGINAL DESCRIPTION OF AËDES EUPLOCAMUS:

Antennal tuft small, at the middle; head hairs single. Air tube a little over 2 × 1 with even pecten of 12 teeth to the middle. Anal segment ringed; gills long, pointed, spotted.

Collected by the junior author at Zent, near Port Limon, Costa Rica, in a ditch. It was named "*Culex trivittatus* Coq." by Mr. Coquillett, but the larva disagrees.

The following is an abstract of the table:

1.	Air tube with the tuft beyond the pecten	8
8.	Pecten of the air tube with evenly spaced teeth	13
13.	Comb scales more numerous to many in a patch	21
21.	Anal segment ringed by the plate	22
22.	Air tube twice as long as wide or less, pecten of 12-14 teeth	26
26.	Scales of comb evenly spinulated without central thorn	27
27.	Body pilose	28
28.	Pecten scarcely over half of tube; tuft normal	29
29.	Lateral hairs single on third to fifth abdominal segments	*euplocamus*

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DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES EUPLOCAMUS:

Female.—Proboscis moderate, subcylindrical, uniform; labellæ conically tapered; vestiture black; setæ curved, minute, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth as long as proboscis, black, with sparse bristly setæ. Antennæ filiform, the joints subequal, distal ones slightly longer, rugose, blackish, pilose; second joint somewhat thickened, pale at base; tori subspherical, with a cup-shaped apical excavation, yellow, brownish black on inner side; hairs of whorls sparse, moderate, black. Clypeus short, rounded triangular, convex, black, nude. Eyes black. Occiput dark brown; vestiture of narrow scales on the center of vertex, broad appressed ones on the sides, silvery-white in middle and along margins of eyes, blackish-brown laterally; yellowish silvery erect forked scales on the nape; setæ along margins of eyes black, those projecting between the eyes pale.

Prothoracic lobes elliptical, remote dorsally, dark brown, similarly colored to sides of mesonotum, with some dark elliptical scales and dark setæ. Mesonotum dark brown, clothed with narrow curved scales, a large elongate silvery-white patch medianly on anterior two-thirds, broadened posteriorly, tridentate behind; golden brown on sides of disk and behind, pale around antescutellar space, the brown scales smaller than the silvery ones. Scutellum trilobate, clothed with dark brown scales and silvery ones medianly, each lobe with a group of brownish-black bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ brown, coxæ luteous, clothed with patches of elliptical, flat white scales and rows of pale setæ.

Abdomen subcylindrical, depressed, tapering posteriorly; dorsal vestiture of black scales, with lateral, basal, segmental, triangular white patches, a row of inconspicuous, median, basal, segmentary small spots of dirty whitish scales, obsolete on last two segments; first segment with black scales and many fine pale hairs; venter wholly yellowish-white scaled. Cerci black.

Wings rather broad, hyaline; petiole of second marginal cell about half as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein about its own length distant from anterior cross-vein; scales wholly blackish brown, the outstanding ones narrowly ligulate, dense and slightly broader on forks of second vein. Halteres whitish, with dark knobs.

Legs slender, moderately long; vestiture black with a bronzy and bluish reflection; femora pale whitish beneath except at tip; knees pale scaled; tibiæ and tarsi without distinct pale markings beneath. Claw formula, 1.1–1.1–1.1.

Length: Body about 4 mm.; wing 3.5 mm.

Male.—Proboscis straight, moderately long, black scaled. Palpi exceeding the proboscis by the length of the last joint; end of long joint and last two joints slightly swollen and with abundant long black hairs; vestiture entirely brownish-black. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, narrowly black ringed at insertion of hair-whorls, pale beyond; hairs long, dense, black shading to brown. Coloration similar to the female, the median silvery patch of the mesonotum larger than in the female and fused behind with the silver-scaled antescutellar area; scutellum largely silver scaled. Abdomen elongate, depressed, dorsally with narrow, yellowish-white, basal segmental bands, dilated laterally only on the seventh segment; lateral ciliation of abundant, long, fine pale hairs. Wings narrower than in the female, the stems of the fork-cells much longer, the vestiture sparse. Claw formula, 2.1–2.1–1.1.

Length: Body about 4 mm.; wing 3 mm.

Genitalia: Side-pieces over twice as long as wide, rounded at tip; apical lobe narrowly continued to base; basal lobe small, rounded prominent, densely setose, with a long stout spine within. Clasp-filament slender, slightly swollen

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in middle, with a long articulated terminal spine. Harpes elliptical, concave, inner margin thickened and revolute, tip pointed and recurved. Harpagones with a columnar base bearing a short seta on inner side at base and an articulated terminal filament, slightly widened mesially and bearing a retrose spine. Unci approximate, revolute, forming a large basal cone. Basal appendages small, approximate, bearing three stout spines at the tip.

Larva, Stage IV (plate 122, fig. 421).—Head rounded, widest through eyes, narrowed anteriorly, a notch at insertion of antennæ, front margin broadly arcuate. Antennæ moderate, slender, sparsely spined, a slight tuft a little before middle; four irregular spines at tip and a digit on a pedicel. Both pairs of dorsal head-hairs single, ante-antennal tuft multiple. Mental plate triangular, with a small central tooth and fourteen on each side, basal ones irregularly placed and broader. Mandible quadrangular, with a patch of short spines outwardly at base; two long filaments from a notch before tip; an outer row of cilia from a collar; a row of densely placed filaments on the outer margin; dentition of four teeth on a process, the first the longest; two spines before, a broad serrate filament and row of wide feathered hairs within; process below deeply furcate, with an irregular row of hairs at base, a tuft on outer margin and on tip of each limb; basal angle moderate, with four stout hairs within and a row at base. Maxilla subspherical, divided by a suture; outer half with a row of short filaments with divided tips on margin, and two complete rows of cilia within, a tuft of long coarse hairs at tip; outer half with two articulated filaments at outer sixth, a small spine on margin and fine hairs over the surface; palpus short and stout, with four rudimentary digits. Thorax rounded, wider than long. Abdomen moderate, anterior segments shorter; lateral hairs in threes on first segment, in twos on second, single on third to sixth; skin spinulose; tracheæ broad, inflated in the thorax. Air-tube stout, tapered on outer half, about two and a half times as long as wide; pecten running to beyond middle, followed by a single tuft of about six hairs; single pecten-tooth a long spine with four or five irregular basal branches. Lateral comb of eighth segment of many scales in a rather small triangular patch; single scales short and rounded, evenly fringed with spinules. Anal segment nearly as long as broad, ringed by the plate; dorsal tuft a long hair and brush on each side; a single lateral hair; ventral brush well developed, confined to the barred area; anal gills long, about twice as long as segment, tapered to a rounded point.

The larvæ live in temporary ground-puddles. Mr. Knab got them in a large muddy puddle in a stream-bed and in water in a hole in the root of a large tree beside a stream. They were associated in the first case with *Psorophora posticatus, Aëdes cuneatus, Psorophora ciliata,* and *Psorophora virescens.*

Mexico to Panama.

Almoloya, State of Oaxaca, Mexico, July 19, 1905 (F. Knab); Sonsonate, Salvador, August 18, 1905 (F. Knab); Ancon, Canal Zone, Panama, July 18, 1908 (A. H. Jennings).

Aëdes euplocamus is closely allied to *Aëdes scapularis,* but as it differs in the coloration of the hind legs we can not do otherwise than consider it distinct. It will probably prove that this species has been confused with *Aëdes scapularis* and that its distribution is much more extensive than here indicated.

AËDES CONDOLESCENS Dyar & Knab.

Culex confirmatus Coffin (not Arribálzaga), in Shattuck, Bahama Ids., 282, 1905.
Ochlerotatus confirmatus Coquillett (in part, not Arribálzaga), U. S. Dept. Agr., Bur. Ent., Tech. Ser. no. 11, 19, 1906.
Aëdes condolescens Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 11, 1907.
Aëdes condolescens Pazos, Anal. Acad. Cien. méd., fis. y nat. Habana, xlv, 422, 1908.
Aëdes condolescens Pazos, Sanidad y Ben., ii, 47, 321, 1909.
Aëdes condolescens Theobald, Mon. Culic., v, 485, 1910.

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ORIGINAL DESCRIPTION OF AËDES CONDOLESCENS:

Proboscis black; head behind the eyes covered with silvery scales; thorax brown, a large silver patch on the disk anteriorly, reaching about three-fourths the length of the thorax, with a broad margin on each side of the brown scales; scutellum brown scaled; abdomen black above with basal white bands on the segments; beneath white with black spots at the hind angles; legs dark, the femora white basally, the white extending nearly to the apex on the under side. Wings dark brown scaled. Claws of the female toothed.

24 specimens, Nassau, Bahamas, June 24, 1903 (T. H. Coffin); Andros, San Salvador, Powell Point, and Long Island, Bahamas (T. H. Coffin).

***Type.*—Cat. no. 10243, U. S. Nat. Mus.**

DESCRIPTION OF FEMALE OF AËDES CONDOLESCENS (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderate, subcylindrical, uniform; labellæ conically tapered; vestiture brownish-black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth as long as proboscis; vestiture brownish-black; setæ moderate, black. Antennæ filiform, the joints subequal, black, rugose, pilose; second joint slightly thickened, paler towards base; tori subspherical, with a cup-shaped apical excavation, yellowish-ocherous shading to black on inner side; hairs of whorls moderate, sparse, black. Clypeus short, rounded triangular, convex, with a slight median impression, black, nude. Eyes bronzy-black. Occiput black, densely clothed with narrow curved scales in the middle, broad flat ones at the sides, broadly sordid silvery-white medianly and along eyes, a large blackish patch on sides, many pale, erect forked scales on nape; bristles black, those projecting forward between eyes pale.

Prothoracic lobes elliptical, remote dorsally, dark brown, concolorous with side of mesonotum, with some elliptical sordid scales and many black setæ. Mesonotum blackish, densely clothed with narrow curved scales, a broad median silvery-white area on anterior two-thirds, widened on its posterior third, cut off squarely a short distance before the antescutellar space; sides dark bronzy-brown, a large lateral area over roots of wings brighter golden-brown, a small area of silvery scales on either side of antescutellar space; bristles moderate, black. Scutellum trilobate, blackish, clothed with narrow, curved, pale golden-brown scales, each lobe with about eight brown bristles. Postnotum elliptical, convex, blackish-brown, nude. Pleuræ blackish, coxæ brownish-luteous, clothed with patches of elliptical, flat white scales and rows of pale bristles.

Abdomen subcylindrical, depressed, tapering posteriorly; dorsal vestiture of black scales with a slight greenish reflection, a narrow white band at base of each segment, widest in the middle, narrowly joined at the sides to a row of triangular white spots; first segment with blackish scales intermixed with pale ones at the sides and with many long, fine pale hairs; venter yellowish-white scaled, a few black scales at sides of seventh segment. Cerci black.

Wings rather broad, hyaline; petiole of second marginal cell shorter than its cell, that of the second posterior cell about the same length as its cell; basal cross-vein distant rather more than its own length from anterior cross-vein; scales of veins blackish brown, the outstanding ones broadly linear, dense and slightly broader on forks of second vein. Halteres whitish, with blackish knobs.

Legs slender, moderately long; clothed with black scales with bronzy and blue reflections; femora beneath whitish except at tips, some of the scales on underside of tibiæ also whitish. Claw formula, 1.1–1.1–1.1.

Length: Body about 4 mm.; wing 3.5 mm.

Life history and habits unknown.

Bahamas and Cuba.

Nassau, New Providence, Bahamas, June 24, 1903 (T. H. Coffin); Andros, Bahamas, June 26, 1903 (T. H. Coffin); San Salvador, Bahamas, 1903 (T. H.

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Coffin); Tarpum Bay, Eleuthera, Bahamas (T. H. Coffin); Powell's Point, Eleuthera, Bahamas (T. H. Coffin); Long Island, Bahamas, 1903 (T. H. Coffin); San Antonio de los Baños, Cuba (J. H. Pazos).

This species is allied to *Aëdes euplocamus,* having similarly colored legs, but the abdomen is dorsally banded with white.

AËDES PERTINAX Grabham.

Culex serratus Coffin (not Theobald), in Shattuck, Bahama Ids., 286, 1905.
Aëdes pertinax Grabham, Can. Ent., xxxviii, 316, 1906.
Aëdes pertinax Dyar & Knab, Proc. Biol. Soc. Wash., xix, 163, 1906.
Protoculex quasiserratus Theobald, Mon. Culic., iv, 463, 465, 1907.
Aëdes pertinax Pazos, Anal. Acad. Cien. méd., fis. y nat. de la Habana, xlv, 424, 1908.
Aëdes pertinax Pazos, San. y Ben., ii, 47, 318, 1909.
Protoculex quasiserratus Theobald, Mon. Culic., v, 401, 1910.
Aëdes pertinax Theobald, Mon. Culic., v, 597, 1910.

ORIGINAL DESCRIPTION OF AËDES PERTINAX:

♀. Head with a triangular yellow area in the centre, made up of yellow hairs and narrow curved scales, some rather broad, flattened ones at the sides, sides and back of the head black, with many upright forked scales and hairs; antennae dark brown, with silvery hairs on the joints; palpi and proboscis black, speckled with silvery hairs. Clypeus dark brown. Prothoracic lobes black, with many long black hairs. Mesothorax black, sparingly covered with very small narrow curved dark brown scales, a narrow line of brilliant golden scales in the middle line extending to the posterior quarter (in some specimens this line is ill-defined, in others broad and conspicuous), a few long hairs near the posterior border and in front of the wing insertions. Scutellum dark brown, with many long black hairs. Pleura grayish, with patches of silvery scales and hairs. Abdomen, upper surface black, with moderate basal bands of yellow scales, and with large lateral areas of silvery ones, two small circular areas of golden scales in the centre of each segment. A few long white hairs along the apical border of each segment. Venter almost entirely white, with creamy scales, a few black scales near the apical borders of the segments. Wings, extremities of the long veins with long narrow scales and short broad ones, upper forked cell longer, but about as broad as the lower, its stem half its length; the stem of the lower forked cell nearly as long as the cell. The posterior cross vein half its own length behind the mid cross vein. Halteres with pale stems and knobs. Legs black, unbanded, femora and tibiae with many yellow scales beneath, fewer in the metatarsi and tarsi; knee spot small. Ungues all equal and uniserrate, the tooth large. Length, 4 mm.

♂.—Head, yellow area in the centre more extensive, broad, flat, yellow scales abundant; palpi black, terminal joints slightly inflated, a little longer than the proboscis; both terminal joints and apex of the antepenultimate densely covered with long hairs, some very stout ones at the apices of the joints. Mesothorax with the band of golden scales conspicuous. Terminal clasp segment slender, curved, slightly swollen in the middle, apical spine blunt, about one-fifth length of limb. Basal clasp segment with a large apical lobe; claspette a well-developed lobe near the base, covered with short spines (no long ones present). Harpes, bases villous with fine hairs, at the apex of each a recurved sickle-like portion. Harpagones deeply infuscated, with a strong recurved spine on each. Unci membranous, separated, each terminating in a point. Setaceous lobes pyramidal, with about ten strong carved spines along the internal borders only. Ungues of the fore and mid legs unequal, the larger claw with two teeth, the smaller with one. Ungues of the hind legs equal and uniserrate. Length 4 mm.

Notes on the adult LARVA.—Head broadly elliptical, long diameter transverse, deeply infuscated. Antenna subcylindrical, with a slight curve inwards, infuscated uniformly. Apex with four short spines, one much longer than the others. Surface with scattered large chitinous spines; the upper surface has in addition several longitudinal rows of minute spines running the whole length of the shaft, the points of these spines directed inwards. Tuft below the middle of about eight short hairs not reaching to the apex of the shaft. Upper and lower epistomal hairs single, a small compound hair on the inner side of these, anteantennal hair tuft of 7-8 divisions. Mentum triangular, with about 30 small teeth. Thorax and abdomen sparingly covered with fine setae. Two large hairs on each side of the first abdominal segment, a single large one on all the others. Comb of about ten scales in a single curved row, each scale with a strong apical spine and a number of fine setae on each

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side, spine as long as the body of the scale. Air tube 2 × 1, deeply chitinized except just below the apex, subconical, slightly swollen above the base. Rows of pecten teeth insertions reaching up half the tube. Teeth evenly spaced, about twelve in number, each with several small denticles on the inner side; these are progressively smaller from above downwards. A pair of large compound hairs at the level of the upper pair of teeth. Band ringing anal segment about two-thirds as long as broad; ventral group of hair tufts (about ten pairs) from a separate barred area; dorsal group composed of a pair compound and simple hairs. Anal gills unequal, tapering; ventral pair a little longer than the longest ventral hairs, dorsal pair one-third as long again as the ventral pair.

Observations.—The larva of this species superficially closely resembles the foregoing [*Aëdes auratus* Grabham], and still more those of *A. hemisurus*, Dyar and Knab. The last named has no rows of spines on the antenna, the comb scales are without spines, having only setae, and the compound hairs in the tube are above the pecten rows. According to Dyar and Knab's table and figure (from N. Y. Ent. Soc., Vol. XIV), it would seem to be near *A. tormentor*, D. & K., a mainland species.

ORIGINAL DESCRIPTION OF PROTOCULEX QUASISERRATUS:

Head silvery-grey in the middle, dark brown at the sides; palpi and proboscis deep brown. Thorax deep brown with a narrow median pale creamy narrow line, slightly broader posteriorly than in front. Abdomen deep brown with basal creamy-white lateral spots. Legs unbanded; ungues all uniserrate.

♀. Head deep brown with median creamy-grey narrow-curved scales, followed by a large patch of small flat black scales, then creamy ones, with dark upright forked scales behind, deep ochreous ones in front and with the bright pale bristles projecting forwards between the eyes; palpi and proboscis black; antennae deep brown.

Thorax black, clothed with narrow-curved bronzy-brown scales and a median line of pale creamy narrow-curved scales slightly widening posteriorly; chaetae deep brown, especially dense over the roots of the wings; scutellum brown with narrow-curved pale scales in the middle, some darker ones at the sides of the pale ones and narrow-curved dark ones on the lateral lobes; posterior border-bristles brown, six to the mid lobe; metanotum brown, pleurae pale brown with silvery-grey sheen and rather indistinct white puncta of flat white scales.

Abdomen deep brown, with large basal lateral white spots, extending nearly along the whole side of the segments, venter mostly white scaled.

Legs deep brown, unbanded, the ungues of all the legs uniserrate.

Wings with the first sub-marginal cell longer and slightly narrower than the second posterior cell, its base slightly nearer the base of the wing, its stem half the length of the cell, stem of the second posterior as long as the cell; posterior cross-vein a little longer than the mid, about its own length distant from it. Wing scales rather dense and the linear ones rather broad.

Length.—5 mm.

Habitat.—Red Hills, Jamaica (Lord Walsingham and Dr. Grabham), Brazil (Dr. Lutz).

Time of capture.—June and July (Jamaica), November (Brazil).

Observations.—Described from a series of five ♀'s. This species comes very close to *C. serratus*, Theobald, on the one side to *C. dupreei*, Coquillett, on the other. From *serratus* it may be known by the much smaller median pale thoracic line and from *dupreei* by its larger size and narrower median thoracic line, which although it is wider behind than in front is not nearly so much so as in that species, and the median stripe is creamy-yellow not silvery-white.

This species is very variable, some show only a trace of the median pale line, in others it is practically absent.

Dr. Grabham writes me the ova are laid separately and are whetstone-shaped.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES PERTINAX:

Female.—Proboscis rather short, subcylindrical, uniform; labellæ conically tapered; vestiture bluish-black; setæ minute, curved, black, those on labellæ more outstanding. Palpi short, less than one-fourth as long as the proboscis; vestiture black, setæ moderate. Antennæ filiform, the joints subequal, rugose, pilose, black; second joint slightly thickened, fusiform, paler at base; tori subspherical, with a cup-shaped apical excavation, yellowish, shading to brown and with a patch of fine setæ on inner side. Clypeus prominent, rounded triangular, depressed, dark brown, nude. Eyes purplish-black. Occiput dark brown, clothed very broadly with narrow curved scales on the vertex, broad flat ones on the

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sides, pale yellow in a broad median stripe, and along eye-margins, a large brownish-black patch on the sides, many erect forked black scales on the nape; bristles along the margins of eyes dark brown, those projecting between eyes whitish.

Prothoracic lobes elliptical, remote dorsally, dark brown, concolorous with sides of mesonotum, with some dark scales and dark setæ. Mesonotum dark brown, covered with narrow curved scales, a narrow, straight, pale yellowish silvery median line from anterior edge of mesonotum to antescutellar space and widening slightly posteriorly, the rest of the vestiture dark brown, slightly lighter colored on posterior half, a few whitish scales and hairs about antescutellar space; bristles dark. Scutellum trilobate, with narrow, curved brown scales, a few pale yellow scales on mid lobe, each lobe with a group of dark brown bristles. Postnotum elliptical, prominent, brownish luteous, nude. Pleuræ brown, coxæ yellowish, clothed with patches of elliptical, flat white scales and pale bristles.

Abdomen subcylindrical, flattened, posterior segments tapering; dorsal vestiture of dull blue-black scales, bristles on posterior borders of segments yellowish, a row of segmental, lateral, basal, triangular, white spots; first segment with black scales and many fine pale hairs; venter yellowish-white scaled, with black scales tending to form apical black bands on the segments. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell about half as long as its cell; that of second posterior cell shorter than its cell; basal cross-vein about its own length distant from anterior cross-vein; scales blackish brown, with a blue reflection along costa, the outstanding ones narrowly ligulate, denser on forks of second vein. Halteres pale, with blackish knobs.

Legs slender, moderately long; vestiture dark bronzy-brown and bluish-black, under side of femora yellowish-white except at tip; mid and hind tibiæ and hind first tarsal joint with a fine line of yellowish-white scales on under side. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis longer and more slender than in the female, straight, bronzy-black scaled. Palpi exceeding the proboscis by the length of the last joint; apical part of long joint and last two joints considerably swollen and with dense, long black hairs; vestiture deep bronzy-brown throughout. Antennæ plumose, the last two joints slender, rugose, pilose, black, the others short, pale, narrowly black ringed at insertions of hair-whorls; hairs long, dense, black; tori entirely blackish. Coloration similar to the female. Abdomen elongate, depressed, the lateral spots tending to form white basal segmental bands; lateral ciliation abundant, long, coarse and pale. Wings narrower than in the female, the stalks of the fork-cells longer, the vestiture less abundant. Claw formula, 2.1–2.1–1.1.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 24, fig. 169): Side-pieces three times as long as wide; apical lobe slender, prominent, conical; basal lobe rounded conical, setose, with a stout spine within. Clasp-filament slender, slightly expanded in middle, with a long terminal articulated spine. Harpes narrowly elliptical, concave, inner margin thickened, revolute, tip pointed, outcurved. Harpagones with a slender, columnar stem and a terminal filament, which is roundedly expanded at base, tip tapered and shortly bent over. Unci approximate, revolute, forming a small basal cylinder. Basal appendages approximate, short, bearing five short spines.

Larva, Stage IV (plate 124, fig. 429).—Head rounded, widest through eyes. Antennæ moderate, slender, uniform, with a small hair-tuft near the middle. Both pairs of dorsal head-hairs single, ante-antennal tuft multiple. Body glabrous. Lateral comb of eighth abdominal segment of about ten to twelve scales in a single irregular row, each scale with a long central spine, the sides

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finely fringed. Air-tube about two and a half times as long as wide, tapering outwardly; pecten of about ten evenly spaced teeth, reaching beyond middle of tube; hair-tuft rather large, situated before the outer tooth. Anal segment longer than wide, ringed by the plate; dorsal tuft a long hair and tuft on each side; lateral hair single; ventral brush well developed, confined to the barred area; anal gills long, tapering, equal.

The larvæ live in temporary ground-pools.

Greater Antilles and Bahamas.

Kingston, Jamaica, July 10, 1906 (M. Grabham); Santo Domingo, August, 1905 (A. Busck); San Antonio de los Baños, Cuba (J. H. Pazos); Nassau, Bahamas, June 24, 1903 (T. H. Coffin); Lake Cunningham, New Providence Island, Bahamas, February 15, 1915 (H. G. Dyar).

The thoracic median line of the adult is variable in width and in one female of Dr. Grabham's original series is nearly obsolete; it is broader in the male. The abdominal markings are also subject to variation, as already pointed out by Theobald. We believe that the specimen from Brazil, included by Theobald in his original description of *Protoculex quasiserratus*, was wrongly associated and is not conspecific.

AËDES SERRATUS (Theobald) Dyar & Knab.

Culex serratus Theobald, Mon. Culic., ii, 45, 1901.
Culex serratus Giles, Handb. Gnats or Mosq., 2 ed., 457, 1902.
Culex nigripes Parker, Beyer & Pothier (not Zetterstedt), Bull. 13, Yell. Fever Inst., U. S. Publ. Health and Mar.-Hosp. Serv., 37, 1903.
Culex serratus Lutz in Bourroul, Mosq. do Brasil, 44, 72, 1904.
Culex serratus Blanchard, Les Moustiques, 360, 1905.
Culex serratus Goeldi, Os Mosq. no Pará, 95, 1905.
Aëdes meridionalis Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 189, 195, 1906.
Ochlerotatus serratus Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 19, 1906.
Aëdes serratus Dyar & Knab, Proc. Biol. Soc. Wash., xix, 162, 1906.
Protoculex serratus Theobald (in part), Mon. Culic., iv, 463, 464, 1907.
Culex serratus Aiken, Brit. Guiana Med. Annual, 1906, 68, 1907.
Aëdes serratus Busck, Smiths. Misc. Colls. (quart. iss.), iii, 64, 1908.
Protoculex serratus Peryassú, Os Culicid. do Brazil, 48, 215, 1908.
Protoculex serratus Theobald (in part), Mon. Culic., v, 401, 1910.

ORIGINAL DESCRIPTION OF CULEX SERRATUS:

Thorax dark brown, with a broad stripe of creamy-grey in the middle. Abdomen brownish-black, with basal white lateral spots, especially noticeable on the apical segments. Ungues of ♀ equal, uniserrated; of ♂ unequal in fore and mid legs, the larger one with two teeth, the smaller with one tooth.

♀. Head brown, clothed with white scales in front and in the middle, brown above and white at the sides, with a few upright yellow forked-scales; eyes purple, bordered with a narrow edge of white; antennæ brown, first joint and base of the second testaceous, with a few fuscous scales, the remaining joints clothed with a pale pubescence and with black verticillate hairs; palpi black, with a few grey scales; proboscis black.

Thorax dark brown, with a broad stripe of creamy-grey scales in the middle, extending from and continuous with the white in the middle of the head and passing back to the scutellum; sides of the mesonotum clothed with dark curved scales, and with golden hairs at the sides and back; scutellum brown, with white scales in the middle and black laterally; metanotum chestnut-brown; pleurae testaceous, with patches of white scales.

Abdomen covered with dark brownish-black scales, with purplish reflections, the deep yellow ground colour showing through at the base in some specimens, giving an almost basally-banded appearance, which in other specimens is absent; laterally there is a basal silvery-white spot, which partly shows on the dorsum, in some specimens most clearly on the last few apical segments; first segment ochraceous, with a patch of purple scales in the middle, and very pilose; posterior borders of the segments edged with long pale hairs; venter almost entirely clothed with white scales.

Legs dark brown; coxæ, under surfaces of the femora and the tibiæ white; in some lights the legs show metallic blue and deep purple reflections; ungues equal and uniserrated.

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Wings with a dusky-yellowish tinge, testaceous at the base; veins clothed with dark brown scales, and edged with long scales towards the apex of the wing, without long scales towards the base; costal and first longitudinal veins covered with deep purplish-black scales; posterior cross-vein scarcely its own length distant from the mid cross-vein; fork-cells both rather short; the first sub-marginal cell very little longer and narrower than the second posterior cell. Halteres pale ochraceous.

Length.—5.5 to 6.5 mm.

♂. Antennæ pale ochraceous, with narrow brownish bands at the verticils; plume-hairs brown; proboscis black; palpi covered with dark brown scales, the last joint pale brown, hairs brown; a little longer than proboscis.

Thorax, &c., as in ♀. Abdomen narrow, covered with dark purplish-brown scales, except at the base of the segments and laterally, where they are more or less nude and testaceous in colour; there are also a few white scales on each side of the fifth, sixth, and seventh segments, and several over the apical segments; posterior borders with golden hairs, ventrally pale; ♂ claspers brown; fore and mid ungues unequal, larger one with two, smaller with one tooth; hind ungues equal, each with a small thick tooth and basal swelling.

Length.—6.5 mm.

Habitat.—Rio de Janeiro (Senhor Carlos Moreira) (9. 12. 1899); Lower Amazon (Austen) (25. 11. 96); New Amsterdam (Rowland) (61); Trinidad (Urich).

Time of capture.—November, in Brazil (November 5), February, in British Guiana.

Observations.—A very distinct species, dull coloured in certain lights, with a broad band of light scales in the middle of the thorax and clear silvery-white spots at the sides, and similarly coloured beneath. Found at New Amsterdam on freshly-drained land and in houses (Rowland).

One ♀ from Rio de Janeiro differs from the rest in having the posterior cross-vein distant about its own length from the mid cross-vein. What remained of the legs also seemed paler, especially the femora, which had many white scales, except at the apex. The thorax had whitish scales in front, the back part being denuded, and the abdomen had a broad pale central mass of scales. It was taken by Senhor Moreira in November with the rest, and is probably only a colour variety.

ORIGINAL DESCRIPTION OF AËDES MERIDIONALIS:

Antennæ with the tuft before the middle; head hairs single; lateral hairs single after the second abdominal segment. Air tube 2 × 1, pecten short, reaching over one-half, followed by a large hair tuft; comb of twelve scales in a straight row. Anal segment broadly ringed.

Taken by the junior author in the forest beyond settlement, Las Loras, near Puntarenas, Costa Rica, in a pond choked by vegetation which is dry in the dry season. The specimen was named "*Janthinosoma musica* Say" by Mr. Coquillett.

The following is an abstract of the table:

1.	Air tube with the tuft beyond the pecten	8
8.	Pecten of the air tube with evenly spaced teeth	13
13.	Comb scales few, in a single or irregularly single row	14
14.	Anal segment ringed by the plate	15
15.	Anal processes moderate, normal	16
16.	Comb of 12 scales; pecten reaching half of tube	*meridionalis*

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES SERRATUS:

Female.—Proboscis rather short, subcylindrical, uniform; labellæ conically tapered; vestiture dull bluish-black; setæ minute, curved, black, those on the labellæ more outstanding. Palpi short, about one-fourth as long as the proboscis; vestiture black, setæ moderate. Antennæ filiform, the joints subequal, rugose, pilose, brown; second joint slightly thickened, fusiform, pale at base; tori subspherical, with a cup-shaped apical excavation, yellowish shading to brown within, with a patch of fine setæ; hairs of whorls sparse, moderate, brown. Clypeus rounded triangular, convex, with a median groove, dark brown, nude. Eyes purplish black. Occiput blackish, clothed broadly with narrow, curved scales on the vertex, broad flat ones on the sides, silvery yellowish-white in a broad median stripe and along margins of eyes, black on each side, white below; many erect black forked scales on the nape; bristles along margin of eyes dark brown, those projecting between eyes yellowish-white.

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Prothoracic lobes elliptical, remote dorsally, dark brown, concolorous with the sides of the mesonotum, with dark setæ. Mesonotum dark brown, covered with narrow curved scales, a rather broad, straight, medio-dorsal line silvery yellowish-white from anterior edge of mesonotum to antescutellar space, similar scales bordering that space, the rest of the vestiture dark brown; bristles dark. Scutellum trilobate, the mid lobe with pale yellow scales, each lobe with a group of dark-brown bristles. Postnotum elliptical, prominent, brownish luteous, nude. Pleuræ and coxæ brownish, clothed with patches of elliptical, flat, dull white scales and pale bristles.

Abdomen subcylindrical, flattened, tapering posteriorly; dorsal vestiture of dull blue-black scales, bristles on posterior borders of segments yellowish, a row of lateral, basal triangular white spots; first segment with black scales and many fine pale hairs; venter yellowish-white scaled, with purplish-black scales along apical angles of segments, tending to form narrow bands. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell about half as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein about its own length distant from anterior cross-vein; scales brownish-black, with a blue reflection along the costa, outstanding ones narrowly ligulate, denser and slightly broader on forks of second vein. Halteres pale, with blackish knobs.

Legs slender, moderately long; vestiture bronzy-black; under side of femora yellowish-white except at tips; tibiæ and first joint of hind tarsi with a narrow line of yellowish-white scales on under side. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis longer and more slender than in the female, straight, black scaled. Palpi exceeding the proboscis by nearly the length of the last joint; end of long joint and last two joints considerably swollen and with dense, long black hairs; vestiture bronzy-black throughout. Antennæ plumose, the last two joints slender, rugose, pilose, black, the others short, pale, narrowly black ringed at insertions of hair-whorls; hairs long, dense, brownish-black; tori entirely blackish. Coloration similar to the female. Abdomen elongate, depressed; lateral spots of segments larger than in the female, the eighth segment with a basal white band; lateral ciliation of abundant, long, fine brown hairs. Wings narrower than in the female, the stalks of the fork-cells longer, the vestiture less abundant. Claw formula, 2.1–2.1–1.1.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 28, fig. 194): Side-pieces over twice as long as wide; apical lobe slender, prominent, conical; basal lobe rounded conical, setose, with a stout spine within. Clasp-filament slender, slightly expanded in middle, with a long terminal articulated spine. Harpes narrowly elliptical, concave, inner margin thickened, revolute, tip pointed, outcurved. Harpagones with a slender columnar stem and a terminal filament, which is linear, pointed at tip, not as long as stem. Unci approximate, revolute, forming a stout basal cylinder. Basal appendages slender, bearing five short spines.

Larva, Stage IV (plate 123, fig. 428).—Head rounded, narrowed before eyes, a slight notch at insertion of antennæ, front margin arcuate, excavate between the incurved clypeal spines. Antennæ moderate, slender, slightly tapered outwardly, sparsely spined, a small tuft before middle; a long spine, three short ones and a digit at tip. Both pairs of dorsal head-hairs single; ante-antennal tuft large, multiple. Mental plate large, triangular, with a slender central tooth and fifteen on each side, basal ones more remotely spaced, the last irregular. Mandible quadrangular, slightly spined toward base; two filaments before tip; an outer row of cilia from a collar; a row of long filaments on outer margin; dentition of four teeth on a process, the first the longest, a spine before, a broad

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filament and row of serrate hairs within; process below furcate, with a row of hairs and a tuft at tip of each limb; basal angle moderate, with four stout feathered hairs within; a row of long hairs at base. Maxilla elongate hemispherical, divided by a suture; inner half indented at outer third, with a row of long processes with plumose divided tips on the margin, two rows of cilia within, the first one running the whole length, a tuft of hairs at tip; outer half with two filaments articulated on a widely furcate base at outer third, outer part hairy, a spine on other side; palpus stout, over half as long as maxilla, with four minute apical digits. Thorax rounded, wider than long. Abdomen moderate, anterior segments shorter; lateral hairs in threes on first segment, in twos on second, single on third to sixth. Air-tube stout, tapered outwardly, over twice as long as wide; pecten of coarse, evenly spaced teeth, occupying basal half; a tuft of six or eight hairs just beyond pecten; single pecten-tooth a long spine with five short basal branches. Lateral comb of eighth segment of ten or eleven scales in a straight row; single scale ending in a long spine, some fine spinules at its base. Anal segment longer than wide, ringed by the plate; dorsal tuft a long hair and brush on each side; a small lateral hair; ventral brush well developed, confined to the barred area; anal gills as long or longer than the segment, tapered to a sharp point.

The larvæ live in temporary ground-pools. Mr. Knab found them in the rainy season in a pond choked by vegetation, which is dry in the dry season.

Tropical America, exclusive of the Antilles.

Nautla, State of Jalisco, Mexico (A. Dugès); Santa Lucrecia, State of Vera Cruz, Mexico, June 21, 1905 (F. Knab); Doña Maria, State of Chiapas, Mexico (D. L. Crawford); Las Loras, near Puntarenas, Costa Rica, September 8, 1905 (F. Knab); Zent, Costa Rica, September 26, 1905 (F. Knab); Bluefields, Nicaragua (W. F. Thornton); Patulue, Guatemala (G. Eisen); Canal Zone, Panama (A. H. Jennings); Trinidad, June, 1905 (A. Busck); Georgetown, British Guiana, June 10, 1905 (E. D. Rowland); Berbice, British Guiana, February 5, 1908 (J. Aiken); São Paulo, Brazil (A. Lutz). Reported also from the States of Amazonas, Pará, Bahia, Rio de Janeiro, Minas Geraes and São Paulo, Brazil (Peryassú).

The records for the United States are based upon misidentifications, the specimens belonging to either *Aëdes tormentor* or *Aëdes atlanticus*. *Aëdes serratus* varies in coloration and specimens occur with a very narrow thoracic median stripe.

AËDES TORMENTOR Dyar & Knab.

Aëdes tormentor Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 189, 191, 1906.
Ochlerotatus serratus Coquillett (in part, not Theobald), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 19, 1906.
Aëdes tormentor Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 4, 1906.
Aëdes tormentor Thibault, Proc. Ent. Soc. Wash., xii, 18, 1910.

ORIGINAL DESCRIPTION OF AËDES TORMENTOR:

This species was collected by Dr. Dupree in Baton Rouge, La., and named "*Culex serratus* Theob." as was also the species we describe as *atlanticus*. We do not believe that either of these forms are identical with the South American species, certainly they both cannot be. It is characterized in the table above.

The following is an abstract of the table:

1. Air tube with the hair tuft within the pecten..... 2
2. Anal segment ringed by the plate..... 3
3. Lateral comb of the eighth segment of few scales in a row... *tormentor*

DESCRIPTION OF FEMALE, LARVA AND EGG OF AËDES TORMENTOR (Male Unknown):

Female.—Proboscis rather short, subcylindrical, uniform; labellæ conically tapered; vestiture dark brown; setæ minute, curved, black, those on labellæ

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more outstanding. Palpi short, about one-fourth as long as the proboscis; vestiture dark brown, setæ moderate. Antennæ filiform, the joints subequal, rugose, pilose, brown; second joint slightly thickened, fusiform, pale at base; hairs of whorls sparse, moderate, black; tori subspherical, with a cup-shaped apical excavation, yellowish shading to brown within, with a patch of fine setæ. Clypeus rounded triangular, depressed, with a median groove, dark brown, nude. Eyes purplish-black. Occiput dark brown, clothed with narrow curved scales on the vertex, broad flat ones on the sides, silvery yellowish-white in the middle and along eye-margins, black on each side, white below, many erect, forked black scales on the nape; bristles along margins of eyes dark brown, those projecting between eyes yellowish-white.

Prothoracic lobes elliptical, remote dorsally, dark brown, concolorous with sides of mesonotum, with dark setæ. Mesonotum dark brown, covered with narrow curved scales, a rather broad, yellowish silvery-white median stripe from anterior edge of mesonotum to posterior margin and involving the antescutellar space, the remaining scales deep brown, bristles over roots of wings and about antescutellar space brownish-yellow. Scutellum trilobate, a few yellowish-white scales on mid lobe, each lobe with a group of dark brown bristles. Postnotum elliptical, prominent, brownish luteous, nude. Pleuræ and coxæ yellowish, clothed with patches of elliptical, flat, white scales and pale bristles.

Abdomen subcylindrical, flattened, tapering posteriorly; dorsal vestiture of black scales with slight violaceous luster, bristles on posterior borders of segments yellowish, a row of large, segmental, lateral, basal, triangular white spots; first segment with black scales and many fine pale hairs; venter yellowish-white scaled, with a few black scales on apical angles of distal segments. Cerci black.

Wings rather broad, hyaline; petiole of second marginal cell about half as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein about its own length distant from anterior cross-vein; scales brown, with a blue reflection along the costa, the outstanding ones narrowly ligulate, denser and broader on forks of second vein. Halteres pale, with blackish knobs.

Legs slender, moderately long; vestiture blackish-brown, under sides of femora yellowish-white, except at tips; hind tibiæ with the under sides narrowly white. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4 mm.

Larva, Stage IV (plate 126, fig. 436).—Head rounded, wider than long, narrowed before eyes, a slight notch at insertion of antennæ, front margin broadly arcuate. Antennæ moderate, slender, curved, sparsely spined; a small tuft at middle; a long and three short apical spines and a digit on a pedestal. Eyes large, transverse, pointed. Both pairs of dorsal head-hairs single, ante-antennal tuft multiple. Mental plate triangular, with a slender central tooth and seventeen on each side, all slender and nearly equal, except a small basal tooth which is distantly removed from the others. Mandible quadrate; two filaments before tip; an outer row of cilia from a collar; a row of fifteen filaments on outer margin; dentition of four teeth on a process, first and fourth longest; a stout spine before, a broad serrate filament and four feathered hairs within; process below furcate, with a row of hairs on upper margin and a tuft at tip of each limb; basal angle sharp, with three hairs within; five long hairs at base. Maxilla hemispherical, divided by a suture; inner half with two rows of cilia and a row of very coarse spines on inner margin, a tuft of short stout hairs at tip; outer half with two moderate filaments above middle and a small subapical spine; palpus small, with four slender apical digits. Thorax rounded, wider than long; hairs moderate. Abdomen stout, anterior segments shorter;

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lateral hairs triple on first segment, double on the second, single on succeeding ones; tracheal tubes broad, expanded into bladders in the metathorax and slightly also in the seventh abdominal segment. Air-tube stout, about twice as long as wide, gradually tapering outwardly; pecten of stout teeth, extending over basal two-thirds of tube, evenly spaced; a small tuft a little beyond the middle; single pecten-tooth a long spine with three basal branches. Lateral comb of the eighth segment of eight or nine thorn-shaped scales in a line; single scale with elliptical base, slightly fringed with minute spinules and with a long smooth rounded terminal spine. Anal segment longer than broad, ringed by the plate; dorsal tuft a long hair and brush on each side; a single lateral hair; ventral brush well developed, rather short, confined to the barred area and posteriorly situated; anal gills as long as the segment or longer, sharply tapered, the lower pair a little shorter than the upper.

Egg (plate 146, fig. 681).—Sharply fusiform, black, reticulate, the reticulations long and hexagonal along one-fourth at both ends, the intermediate portion with rhomboidal reticulations.

The eggs are laid singly. The larvæ are undoubtedly inhabitants of temporary ground-pools, though we have no notes on the life history.

Southern United States.

Baton Rouge, Louisiana (J. W. Dupree); Westpoint, Mississippi, August 11, 1904 (H. S. Barber); Corinth, Mississippi, August 14, 1904 (H. S. Barber); Jacksonville, Florida (H. Byrd); Scott, Arkansas, August 31, 1908 (J. K. Thibault, Jr.).

Aëdes tormentor inhabits the Gulf coast region, the related *Aëdes atlanticus* the Atlantic coast region, but both species occur in Florida. Both have been confused by Theobald and his followers with *Aëdes serratus*, from which they differ in the coloration of the legs. The median stripe of the mesonotum is usually about one-fourth its width and is continued over the antescutellar space to the posterior margin.

AËDES ATLANTICUS Dyar & Knab.

Culex serratus Smith (not Theobald), Ent. News, xiv, 309, 1903.
Culex serratus Smith (not Theobald), Bull. 171, N. J. Agr. Exp. Sta., 38, 1904.
Culex serratus Felt (not Theobald), Bull. 79, N. Y. State Mus., 334, 1904.
Protoculex serratus Felt (not Theobald), Bull. 79, N. Y. State Mus., 391*d*, 1904.
Protoculex serratus Dyar (not Theobald), Proc. Ent. Soc. Wash., vii, 48, 1905.
Culex serratus Smith (not Theobald), N. J. Agr. Exp. Sta., Rept. Mosq., 277, 1905.
Protoculex serratus Felt (not Theobald), Bull. 97, N. Y. State Mus., 449, 490, 1905.
Culex confirmatus Ludlow (not Arribálzaga), Can. Ent., xxxvii, 388, 1905.
Aëdes atlanticus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 190, 198, 1906.
Ochlerotatus serratus Coquillett (in part, not Theobald), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 19, 1906.
Aëdes atlanticus Dyar, U. S. Dept. Agr., Bur. Ent., Circ. 72, 4, 1906.
Protoculex serratus Theobald (not Theobald), Mon. Culic., iv, 464, 1907.
Aëdes serratus Morse (not Theobald), Ann. Rept. N. J. State Mus., 1909, 719, 1910.
Leucomyia scapularis Theobald (in part), Mon. Culic., v, 315, 1910.

ORIGINAL DESCRIPTION OF AËDES ATLANTICUS:

Figured by Prof. J. B. Smith under the name "*Culex serratus* Theobald" as determined for him by Mr. Coquillett (N. J. Agr. exp. Sta., Rept. Mosq., 280, fig. 86, 1905). While it is possible that this is the true *serratus* of Theobald, described from Brazil and Guiana, we do not think it is probable, especially in view of what we note under *Aëdes tormentor* above. We therefore propose a new name for the Atlantic coast form. Prof. Smith has taken it in New Jersey and the senior author at Sanford, Florida.

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The following is an abstract of the table:

1. Air tube with the tuft beyond the pecten	8
8. Pecten of the air tube with evenly spaced teeth	13
13. Comb scales few, in a single or irregularly single row	14
14. Anal segment ringed by the plate	15
15. Anal processes moderate, normal	16
16. Comb of six scales; pecten not reaching half of tube	17
17. Pecten of air tube running about one-half; anal segment longer than wide	*atlanticus*

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES ATLANTICUS:

Female.—Proboscis rather short, subcylindrical, uniform; labellæ conically tapered; vestiture dark brown; setæ minute, curved, black, those on labellæ more outstanding. Palpi short, about one-fourth as long as the proboscis; vestiture dark brown, setæ moderate. Antennæ filiform, the joints subequal, rugose, pilose, black; second joint slightly thickened, fusiform, pale at base; tori subspherical, with a cup-shaped apical excavation, yellowish shading to brown within, with a patch of fine setæ; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, convex, medianly depressed, dark brown, nude. Eyes purplish black. Occiput dark brown, clothed with narrow, curved scales on the vertex, broad flat ones on the sides, silvery white on vertex and along margins of eyes, black on the sides, white below, many erect, forked dark scales on the nape; bristles along margins of eyes dark brown, those projecting between eyes whitish.

Prothoracic lobes elliptical, remote dorsally, dark brown, concolorous with sides of mesonotum, with dark scales and setæ. Mesonotum dark brown, covered with narrow curved scales, a rather broad silvery white median stripe from the anterior edge and continued over the antescutellar space to the posterior margin, the rest of the vestiture dark brown; bristles over roots of wings and about antescutellar space dark brown. Scutellum trilobate, the mid lobe with silvery-white scales, each lobe with a group of dark brown bristles. Postnotum elliptical, prominent, brownish luteous, nude. Pleuræ and coxæ yellowish, clothed with patches of elliptical, flat, white scales and pale bristles.

Abdomen subcylindrical, flattened, tapering posteriorly; dorsal vestiture of dull blue-black scales, bristles on posterior borders of segments yellowish, a row of large segmental, lateral, basal, triangular white spots; venter yellowish-white scaled, with black scales along posterior margins of last three segments. Cerci black.

Wings rather broad, hyaline; petiole of second marginal cell about half as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein about its own length distant from anterior cross-vein; scales brown, the outstanding ones narrowly ligulate, denser on forks of second vein. Halteres pale, with blackish knobs.

Legs slender, moderately long; vestiture brownish-black; under sides of femora yellowish white except at tips; tibiæ pale beneath, bronzy. Claw formula, 1.1–1.1–1.1.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis longer than in the female, straight, deep bronzy-brown scaled. Palpi exceeding the proboscis by the length of the last joint; end of long joint and last two joints considerably swollen and with dense, long brown hairs; vestiture deep bronzy-brown throughout. Antennæ plumose, the last two joints slender, rugose, pilose, black, the others short, pale, narrowly black ringed at insertions of hair-whorls; hairs long, dense, black with brown luster; tori entirely blackish. Coloration similar to the female. Abdomen elongate, depressed, with rather irregular, long and fine, pale yellow lateral ciliation. Wings nar-

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rower than in the female, the stalks of the fork-cells longer, the vestiture less abundant. Claw formula, 2.1–2.1–1.1.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 28, fig. 192): Side-pieces three times as long as wide, conically tapered; apical lobe slender, prominent, conical, basal lobe broadly expanded, three times as wide as long, setose, with a stout spine within. Clasp-filament slender, slightly expanded in the middle, with a long terminal articulated spine. Harpes narrowly elliptical, concave, inner margin thickened, revolute, tip pointed, outcurved. Harpagones with a very stout bent columnar stem, finely pilose and with a terminal filament, which is broadly expanded medianly, the tip bluntly rounded. Unci approximate, revolute, forming a small basal cylinder. Basal appendages approximate, short, bearing five short spines.

Larva, Stage IV (plate 126, fig. 437).—Head rounded, widest through eyes, narrowed before, a notch at insertion of antennæ, front margin arcuate. Antennæ moderate, slender, sparsely spined; a small tuft towards middle; three short irregular spines and a stout digit at tip. Both pairs of dorsal head-hairs single, ante-antennal tuft multiple. Mental plate elongate triangular, with a small central tooth and sixteen on each side, basal ones progressively stouter and more remote. Mandible rounded quadrangular, with an area of short spines outwardly near base; a long filament and a short one from a notch before tip; an outer row of cilia from a collar; a row of long filaments on outer margin and a row of fine slender hairs with coincident bases; dentition of four teeth on a process, first and fourth slightly longer; two spines before, two short double teeth at base, a broad filament and a row of feathered hairs within; process below furcate, with a row of hairs on outer margin and a tuft at tip of each limb; basal angle moderate, a row of sparse coarse hairs within; a row at base. Maxilla irregularly hemispherical, divided by a suture; inner half with a row of stout filaments with divided tips on the margin, a row of stout hairs within and a row of cilia near the suture; inner half with two filaments near apex, a long spine near apical hair-tuft, a short spine on margin and sparsely distributed hairs over the surface; palpus short and stout, rounded, with four rudimentary apical digits. Thorax rounded, wider than long. Abdomen moderate, anterior segments shorter; lateral hairs in threes on first segment, in twos on second, single on third to sixth. Air-tube stout, slightly tapered on outer half, two and a half times as long as wide; pecten running to middle, of few teeth, followed by an ample tuft; single pecten-tooth a long spine with three basal branches. Lateral comb of eighth segment of six large thorn-shaped scales in a row; single scale with large central spine and short basal spinules. Anal segment as long as wide, ringed by the plate; dorsal tuft a long hair and brush on each side; ventral brush well developed, confined to the barred area; anal gills regularly tapered, lower pair as long as segment, upper pair longer.

The larvæ inhabit temporary ground-pools. Dr. Dyar found them in a semi-permanent marshy pool, containing leaves of small water-plants, but joined to a railroad ditch. They were associated with *Psorophora floridense* and *P. ciliata*. Professor Smith found the larvæ in woodland pools with *Aëdes canadensis* and *A. sylvestris*. He found the adults in low swampy woods, from which they did not emerge, and only bit when their haunts were invaded. Larvæ appear at intervals during the season, and the eggs undoubtedly hibernate.

Southern Atlantic States.

New Brunswick, New Jersey, August 1 (through J. B. Smith); Sanford, Florida, March 17, 1905 (H. G. Dyar). Reported also from Staten Island, New York (Felt).

Aëdes atlanticus takes the place of *Aëdes tormentor* upon the Atlantic coast, but both species occur in Florida. As remarked in the discussion of *A. tor-*

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mentor, both species have been confused with *Aëdes serratus* by Coquillett, Theobald and others. All three species are very distinct in larval characters. The coloration of the adults shows some variation.

AËDES BRACTEATUS (Coquillett) Pazos.

Culex bracteatus Coquillett, Proc. Ent. Soc. Wash., vii, 184, 1906.
Aëdes habanicus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 190, 198, 1906.
Ochlerotatus bracteatus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 19, 1906.
Aëdes bracteatus Pazos, Anal. Acad. Cien. méd., fis. y nat. de la Habana, xlv, 423, 1908.
Aëdes bracteatus Pazos, San. y Ben., ii, 47, 320, 1909.
Culex bracteatus Theobald, Mon. Culic., v, 612, 1910.

ORIGINAL DESCRIPTION OF CULEX BRACTEATUS:

Near *confirmatus*, but the patch of scales on median portion of anterior half of the mesonotum is golden brown, instead of whitish. Proboscis and palpi brown-scaled, occiput brassy-yellow-scaled and with a patch of brown ones on each side. Scales in middle of anterior two-thirds of the mesonotum golden brown, those along the sides and on posterior third of the mesonotum deep brown, the latter intermixed with brassy-yellow ones. Abdomen black-scaled, a narrow band of whitish ones at base of each segment, expanded into lateral spots on the last three segments, venter whitish-scaled, the black of the dorsum encroaching on the hind angles of the first five segments. Legs black-scaled, the bases and large portion of the underside whitish-scaled; claws of front and middle tarsi toothed, those of the hind ones simple. Scales of wings brown. Length 3.5 mm.

Habana, Cuba. Four females collected by Mr. J. R. Taylor.

Type.—No. 7753, U. S. National Museum.

ORIGINAL DESCRIPTION OF AËDES HABANICUS:

Antennae rather small with the tuft at the middle; head hairs single; body coarsely hairy; lateral hairs mostly lost, but two are present on the sixth abdominal segment; air tube two-and-a-half times as long as wide, the pecten reaching to the middle, followed by the hair tuft; anal segment broadly ringed by the plate; anal gills short, about as long as the segment.

Havana, Cuba, Oct. 28, 1903, from Mr. John R. Taylor, labelled "*Culex confirmatus* Arrib." we do not know on whose authority. They were associated with many *Psorophora ciliata*, and doubtless came from some temporary pool or swamp.

The following is an abstract of the table:

1.	Air tube with the tuft beyond the pecten	8
8.	Pecten of the air tube with evenly spaced teeth	13
13.	Comb scales more numerous to many in a patch	21
21.	Anal segment ringed by the plate	22
22.	Air tube twice as long as wide or less, pecten of 12-14 teeth	26
26.	Scales of comb evenly spinulated, without central thorn	27
27.	Body pilose	28
28.	Pecten scarcely over half of tube; tuft normal	29
29.	Lateral hairs double or in threes on these segments	30
30.	Anal segment moderate with broad ring	*habanicus*

DESCRIPTION OF FEMALE AND LARVA OF AËDES BRACTEATUS (MALE UNKNOWN):

Female.—Proboscis rather long and slender, subcylindrical; labellæ conically tapered; vestiture black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth as long as the proboscis, clothed with black scales and moderate, stiff bristles. Antennæ filiform, the joints subequal, rugose, pilose, black, second joint slightly swollen beyond middle, yellow at base; tori subspherical, with a cup-shaped apical excavation, luteous, blackish and with a patch of fine black hairs on inner side; hairs of whorls moderate, sparse, black. Clypeus rounded triangular, convex, black, nude. Eyes black. Occiput black, clothed with broad, flat, dull white scales, a narrow median line of narrow curved, silvery yellow scales on the vertex and similar ones along margins of eyes, a diffused black patch on the sides close to eye-margin, many erect forked pale yellow scales on the nape; bristles along margins of eyes black, those projecting between eyes pale yellow.

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Prothoracic lobes elliptical, remote dorsally, dark brown, with pale yellow scales and with numerous black bristles. Mesonotum dark brown, clothed with narrow, curved scales, very broadly coppery golden-brown on disc, indistinctly indented laterally before middle, dark bronzy-brown along lateral margins, two brown subdorsal spots posteriorly before antescutellar space; scales about antescutellar space paler; setæ rather short, dark brown. Scutellum trilobate, brown, clothed with narrow, curved golden scales, each lobe with a group of blackish bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ brown, coxæ luteous, clothed with patches of elliptical white scales and rows of pale bristles.

Abdomen subcylindrical, somewhat flattened, tapering posteriorly; dorsal vestiture dull black, narrow bands of sordid white scales at bases of segments, triangularly widened in the middle, absent on last segment, a row of large, segmental, lateral, triangular, basal yellowish-white patches extending to apical margins; first segment dark or pale scaled, with many fine pale hairs; venter yellowish-white scaled. Cerci black.

Wings moderate, hyaline; petioles of second marginal and second posterior cell shorter than their cells and about equal; basal cross-vein distant more than its own length from anterior cross-vein; scales brownish-black, the outstanding ones narrowly ligulate, denser on forks of second vein. Halteres blackish, with whitish knobs.

Legs moderately slender; vestiture bronzy-black with bluish luster; femora beneath yellowish-white except at tips, under sides of tibiæ with a whitish reflection and a few pale scales at bases of first tarsal joints. Claw formula, 1.1–1.1–1.1.

Length: Body about 4 mm.; wing 3.5 mm.

Larva, Stage IV (plate 120, fig. 416).—Head rounded, widest through eyes, narrowed before eyes, a notch at insertion of antennæ, front margin arcuate. Antennæ moderate, slender, very sparsely spined, with a small hair-tuft at the middle; three irregular spines and a digit on a pedicel at tip. Both pairs of dorsal head-hairs single, ante-antennal tuft multiple. Mental plate elongate-triangular, with a central tooth and fifteen on each side, the last two small, irregular and remote. Mandible quadrangular, with coarse, stout spines outwardly at base; two filaments from a notch before tip; an outer row of cilia from a collar; a row of filaments on outer margin; dentition of four teeth on a process, the first the largest; two spines before, two short bifid teeth at base, a broad serrate filament and row of feathered hairs within, the outermost of which is broadened at base; process below curved, strongly furcate, with a short row of hairs on outer margin and a tuft at tip of each limb; basal angle moderate, a row of three stout hairs and a detached one within; a row of stout hairs at base. Maxilla bluntly conical, divided by a suture; inner half with a row of filaments on margin from base to middle, their tips divided, a row of cilia from base to apex, a tuft of long hairs at tip; outer half with two filaments near apex adjoining the suture and a small spine on outer margin; palpus short and stout, with four minute apical digits. Thorax rounded, wider than long; abdomen moderate, the anterior segments shorter; skin coarsely hairy. Air-tube tapered outwardly, about two and a half times as long as wide; pecten teeth coarse, rather long, running to middle, single tooth a long spine with three or four basal branches; a single tuft beyond the pecten. Lateral comb of eighth segment of many scales in a rather small triangular patch; single scale short and broad, evenly fringed with spinules. Anal segment as long as broad, ringed by the plate; dorsal tuft a long hair and brush on each side; ventral brush well developed, confined to the barred area; anal gills short and stout, not as long as the segment, tapered outwardly.

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Life history and habits unknown. Dr. Pazos has obtained eggs and according to a drawing he sent us they are rhomboidal in outline. They were deposited singly. The larvæ undoubtedly occur in temporary ground-pools, as do those of the related species.

Cuba.

Havana, November 1, 1902 (J. R. Taylor); Cayamas, May 8, 10, 31 (E. A. Schwarz); San Antonio de los Baños (J. H. Pazos). Reported also from Isle of Pines (Pazos).

Aëdes bracteatus is one of a group inhabiting the Antilles, which differ on each island. The differences are but slight, yet we consider them, tentatively at least, as specific. In the Bahamas this species is represented by *Aëdes plutocraticus*, in Santo Domingo by *A. balteatus* and in Jamaica by *A. tortilis*, while we have from St. Thomas a single specimen differing slightly from all, but which we do not venture to describe on so slender a material. We think these are all species, not races of one species, since the only two larvæ known to us, namely those of *bracteatus* and *tortilis*, differ.

The disc of the mesonotum varies considerably in intensity of coloration and in the definition of the color-pattern. In some specimens this area is dark coppery brown and blends with the darker lateral areas, while in others it is of a creamy color and in strong contrast with the lateral zones.

AËDES PLUTOCRATICUS Dyar & Knab.

Culex confirmatus Coffin (in part, not Arribálzaga), in Shattuck, The Bahama Ids., 282, 1905.

Aëdes plutocraticus Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 11, 1907.

Aëdes plutocraticus Theobald, Mon. Culic., v, 485, 1910.

ORIGINAL DESCRIPTION OF AËDES PLUTOCRATICUS:

Proboscis and palpi black; head clothed with creamy scales behind the eyes; thorax coppery bronze, a distinct dark brown spot occupying the anterior half laterally joined behind to the lateral brown area; medianly there are two rather ill-defined brownish stripes; abdomen black above, with narrow basal white bands, beneath white, the hind angles with black triangular spots. Wings dark brown, scaled. Legs black, the tibia and tarsi bronzy beneath; femora white on the under side. Claws of the female toothed.

63 specimens, Nassau, Andros, San Salvador, Tarpon Bay and Powell Point, Bahama (T. H. Coffin).

Type.—Cat. no. 10251, U. S. Nat. Mus.

DESCRIPTION OF FEMALE AND MALE OF AËDES PLUTOCRATICUS (LARVA UNKNOWN):

Female.—Proboscis moderate, subcylindrical; labellæ conically tapered; vestiture black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, less than one-fifth as long as the proboscis, clothed with black scales and moderate, stiff bristles. Antennæ filiform, the joints subequal, rugose, pilose, black; second joint slightly thickened, fusiform, yellow at base; tori subspherical, with a cup-shaped apical excavation, luteous, blackish and with a patch of fine black hairs on inner side; hairs of whorls moderate, sparse, black. Clypeus rounded triangular, depressed in the middle, nude, black. Eyes black. Occiput black, clothed with broad, flat, dull white scales, a median line of narrow, curved, yellowish silvery scales on the vertex and similar ones along eye-margins, a large, diffused black patch on the sides close to eye-margin, many erect forked scales on nape, some black, most pale yellow; setæ along margins of eyes black, those projecting between eyes pale yellow.

Prothoracic lobes elliptical, remote dorsally, dark brown, concolorous with sides of mesonotum, with some whitish scales and numerous black bristles. Mesonotum dark brown, clothed with narrow curved scales, a broad golden

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brown median area, expanded to lateral margin behind the middle and enclosing two indistinct, darker submedian lines, large, deep brown lateral patches at anterior third and smaller ones at posterior third; scales about antescutellar space and over roots of wings paler; setæ rather short, brown. Scutellum trilobate, brown, clothed with narrow, curved, pale golden brown scales, each lobe with a group of blackish bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ brown, coxæ luteous, clothed with patches of elliptical white scales and rows of pale bristles.

Abdomen subcylindrical, somewhat flattened, tapering posteriorly; dorsal vestiture black with a slight metallic reflection, very narrow bands of sordid white scales at the bases of segments, becoming obsolete at the sides and obscure outwardly, a row of triangular lateral basal segmental yellowish white patches; first segment black scaled and with many pale hairs; venter yellowish-white scaled. Cerci black.

Wings rather broad, hyaline; petioles of second marginal and second posterior cells shorter than their cells and about equal; basal cross-vein distant nearly its own length from anterior cross-vein; scales brown, outstanding ones narrowly ligulate, somewhat denser on forks of second vein. Halteres whitish, with blackish knobs.

Legs slender, moderately long; vestiture dull bronzy-brown with a bluish luster; femora beneath yellowish-white except at tips; mid and hind tarsi with a pale line beneath, becoming indistinct distally. Claw formula, 1.1–1.1–1.1.

Length: Body about 4 mm.; wing 3.5 mm.

Male.—Proboscis straight, long and slender, dark bronzy brown scaled. Palpi exceeding the proboscis by nearly the length of the last joint; end of long joint and the last two joints slightly swollen and with long, dense, shining brown hairs; vestiture dark bronzy brown. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, pale, narrowly ringed with black at insertions of hair-whorls; hairs long, dense, shining brown; tori entirely blackish. Coloration similar to the female. Abdomen elongate, depressed, the white dorsal segmental bands broader than in the female, uniform; lateral ciliation long, fine, abundant, pale yellow. Wings narrower than in the female, the stalks of the fork-cells longer, the vestiture sparse. Claw formula, 2.1–2.1–1.1.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 30, fig. 203): Side-pieces three times as long as wide, small at tip; apical lobe roundedly prominent, basal small, rounded, densely setose, with a stout curved spine within. Clasp-filament slender, slightly swollen in the middle, with a long articulated terminal spine. Harpes narrowly elliptical, concave, inner margin thickened and revolute, tip pointed and recurved. Harpagones with a slender columnar stem bearing a seta at its middle and a terminal articulated filament, which is widened in the middle and bears a retrose spine with a small denticle below it. Unci contiguous, revolute, forming a moderate basal cylinder. Basal appendages small, bearing five stout spines.

Life history and habits unknown.

Bahama Islands.

Nassau, New Providence, June 24, 1903 (T. H. Coffin); Andros, June 26, 1903 (T. H. Coffin); Tarpum Bay, Eleuthera (T. H. Coffin); Powell's Point, Eleuthera (T. H. Coffin); San Salvador (T. H. Coffin); Current Settlement, Eleuthera, July 5, 1903 (T. H. Coffin).

As remarked in the discussion of *bracteatus*, this species is the representative in the Bahamas of that Cuban species.

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AËDES TORTILIS (Theobald).

Culex tortilis Theobald, Entomologist, xxxvi, 281, 1903.
Culex tortilis Theobald & Grabham, Mosq. of Culic. of Jamaica, 26, 1905.
Aëdes auratus Grabham, Can. Ent., xxxviii, 313, 1906.
Aëdes auratus Dyar & Knab, Proc. Biol. Soc. Wash., xix, 163, 1906.
Culex tortilis Theobald, Mon. Culic., iv, 428, 1907.
Culex tortilis Theobald, Mon. Culic., v, 387, 1910.
Aëdes auratus Theobald, Mon. Culic., v, 598, 1910.

ORIGINAL DESCRIPTION OF CULEX TORTILIS:

Head golden scaled; proboscis unbanded; thorax adorned with golden scales, and a large dark brown patch on each side in front, the back of the mesonotum also darkened; pleurae with grey scales. Abdomen deep brown with violet reflections; the second, third, fourth and fifth segments with narrow basal pale bands; venter pale yellow scaled. Legs deep brown, unbanded; venter of femora and coxae white. Ungues equal.

♀. Head brown, clothed with narrow-curved golden-yellow scales, a few black bristles, and ochraceous upright forked scales; proboscis and palpi deep brown; antennae brown; basal joint testaceous; second joint very *large and swollen*, deep brown. Thorax deep brown, the middle of the mesonotum clothed with narrow-curved golden scales; on each side in front a roundish rich deep brown patch, and the posterior part of the mesonotum with darker scales than the front, being almost brown, but not so dark as the front lateral areas; scutellum with dull golden-brown scales and brown border-bristles; metanotum bright chestnut-brown; pleurae pale brown, with spots of grey scales. Abdomen black in some lights, rich deep but dull violet in others; the first segment with dusky scales, forming two spots and pale golden hairs; the second, third, fourth and fifth segments with narrow pale yellowish basal bands, not extending quite across the segments, the fifth sometimes very inconspicuous; basal lateral white spots most prominent on the apical segments; venter clothed with creamy yellow scales; border-bristles of the dorsum pale golden. Legs deep brown, except the coxae and venter of the femora, which are grey to creamy yellow; femora, tibiae, and hind metatarsi with black bristles; hind metatarsi very nearly as long as the hind tibiae; fore and mid ungues equal, uniserrated; hind equal and simple. Wings clothed with typical brown *Culex* scales; fork-cells rather short; first submarginal cell very slightly longer, but narrower than the second posterior cell, its stem about as long as the cell, its base about level with the base of the second posterior cell, if anything slightly nearer the apex; stem of the second posterior cell not quite as long as the cell; posterior cross-vein very short, about twice its own length distant from the mid; a pale spot at the base of the wing; halteres testaceous. Length 4 to 4.5 mm.

Hab. Kingston, Jamaica.

Time of capture. August.

Observations.—Described from a series of females taken by Dr. Grabham. They are very distinct, small, thick-set mosquitoes, easily told by the thoracic adornment, the two dark spots on the front of the mesothorax being very characteristic; their unbanded legs at once separate them from *Culex secutor*, Theob., or *C. janitor*, Theob., and they are of much stouter build. When alive they can easily be identified by the character noticed by Dr. Grabham, of carrying their hind legs twisted right forward over their head, when settled, after the manner of *Wyeomyias*. There is some variation in the venation. Some specimens show the base of the first submarginal cell slightly nearest the apex, and the posterior cross-vein as long as the mid cross-vein, and about its own length distant from it. In others the basal abdominal banding is very faint; in one there is a *trace* of an additional basal abdominal band.

ORIGINAL DESCRIPTION OF AËDES AURATUS:

♀. Head covered with narrow curved yellow scales and hairs. Many forked upright yellow scales at the back; a few forked upright black scales and black hairs at the sides. Antennae dark brown, joints with pale yellow hairs. Palpi black, speckled with yellow scales. Proboscis black, with scattered yellow scales and hairs, especially near the base. Clypeus black. Thorax rich golden yellow. Prothoracic lobes with black hairs and yellow scales. Mesothorax densely covered with narrow curved golden-yellow scales in front, somewhat more scantily at the back (scales of thorax darker in shade than those on the head); on each side in front, near the middle line, there are two small dark spots; there is also a large dark area on each side reaching from the prothoracic lobes to above the wing insertions, and extending laterally to the margin, and a pair of conspicuous black spots near the middle line

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on the posterior third. A row of black hairs extends from these spots to the posterior margin of the mesothorax. Scutellum with patches of yellow scales on the mid and lateral lobes. Pleura grayish, with patches of white scales and hairs. Metanotum brown. Abdomen black, with narrow basal bands of golden scales and a row of long white hairs along the posterior margin of each segment; lateral areas of silvery scales on the hinder segments; scattered over the dark scaled areas are a number of lighter scales, which form an ill-defined stripe along the middle of the abdomen. Venter white scaled, small apical areas of black scales on the hinder segments at the sides. Legs black: femora white below through the whole length, except near the apex, where there is a black spot; thickly speckled with white scales above, especially near the base; knee spots small. Tibiae, metatarsi and tarsi all ventrally white scaled, a few long bristles on the joints, those along the tibiae longest. Ungues all equal and uniserrate. Wings, veins covered with broad, short, flattened scales, extremities of the upper veins with long narrow ones as well. Upper forked cell narrow and a little longer than the lower. Stem about half its length. Posterior cross vein rather more than its own length distant from the mid cross vein. Halteres with pale stems and knobs. Length, 3.5 mm.

♂.—Proboscis black, nearly as long as the palpi, with scattered yellow scales, especially near the base, apex slightly swollen, tip light brown. Both terminal joints of the palpi somewhat swollen, and covered with many long black hairs, more numerous underneath. Ungues of the fore and mid tarsi very nearly equal, larger with two teeth, smaller with one basal tooth; ungues of the hind tarsi equal and uniserrate. Genitalia closely resembling those described and figured by Felt (N. Y. State Museum, Bulletin 97), for *Culicada confirmatus*, Theo. The spine at the apex of the terminal clasp segment is about one-fifth length of segment. Claspette obsolete, represented by a few weak setae and long hairs, one hair much longer than the others, curved at the tip and swollen towards the base. Harpes slender, curved, base without hairs. Harpagones stout, very deeply infuscated, with a recurved sharp point. Setaceous lobes with a few short, stout setae. Length, 3.5 mm.

Notes on the adult LARVA.—The fully grown larva attained a length of nearly ¼ inch. Head nearly circular, deeply infuscated; antennae uniformly chitinized, short, stout, subconical, gradually tapering to the apex, straight along the inner surface, outer surface with a constriction at the lower third, giving the antennal shaft a semi-bulbous outline at the base. Apex with four short, stout spines. Tuft below the middle of about six short hairs not reaching to the apex. Lower surface of antenna with a few large isolated chitinous spines, upper surface with several longitudinal lines of small closely-placed spines; these lines extend through nearly the whole length of the antennal shaft; near the base they divide and ramify. The spines vary much in size, and are for the most part directed inwards. Mentum broadly triangular, with about 40 rather small teeth. Upper and lower epistomal hairs single, short; anteantennal hair tuft with about ten divisions. Thorax densely spinous, with short, stout, thorn-like spines; abdominal spines less dense, arranged in ill-defined transverse rows. Lateral hairs paired on the first segment, single on all the other segments. Scales of lateral comb about 15 in a group. Each scale bordered with fine setae, one or two rather longer terminal spines, the longest of those about half as long as the body of the scale. Air tube about twice as long as broad, a little inflated above the base, deeply infuscated except just at the apex; pecten reaching to the middle, a pair of rather weak hair tufts on a level with the highest pair of pecten teeth; teeth about 15 in number, deeply chitinized, each tooth with several minor teeth on the inner side, one of the latter greatly exceeding the others in size. Anal plate completely encircling the segment, about two-thirds as long as broad; ventral hair tufts about ten pairs springing from a separate barred area; dorsal group of two pairs, upper pair short, compound; lower simple, four times as long as the former. Anal gills equal, lanceolate, narrowing to a fine point, about half as long again as the ventral hair group.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES TORTILIS:

Female.—Proboscis moderate, subcylindrical, labellæ conically tapered; vestiture bronzy black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth as long as the proboscis, clothed with black scales and moderate, stiff black bristles. Antennæ filiform, the joints subequal, rugose, pilose, black, second joint slightly thickened, fusiform, yellow, dark at apex; tori subspherical, with a cup-shaped apical excavation, luteous, blackish and with a patch of fine black hairs on inner side; hairs of whorls moderate, sparse, black. Clypeus rounded triangular, somewhat depressed,

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blackish, nude. Eyes bronzy-black. Occiput black, clothed broadly with narrow curved scales on vertex, flat ones on the sides, pale golden yellow dorsally and along eye-margins, a diffused black patch well down the sides, many pale yellow, erect forked scales on the nape; setæ along margins of eyes black, those projecting between eyes pale yellow.

Prothoracic lobes elliptical, remote dorsally, dark brown, concolorous with sides of mesonotum, with pale scales and numerous black bristles. Mesonotum dark brown, clothed with narrow, curved scales, dull golden, marked with dark brown in a large lateral patch on anterior third and a small spot at posterior third; setæ rather short, black. Scutellum trilobate, brown, clothed with narrow curved dull golden scales, each lobe with a group of blackish bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ brown, coxæ luteous, clothed with patches of elliptical white scales and rows of pale bristles.

Abdomen subcylindrical, somewhat flattened, tapering posteriorly; dorsal vestiture black with a slight metallic reflection, very narrow bands of sordid white scales at bases of segments, obscure outwardly, a row of triangular lateral basal segmental yellowish-white patches; first segment black scaled, with many fine pale yellow hairs; venter yellowish-white scaled. Cerci black.

Wings rather broad, hyaline; petioles of second marginal and second posterior cells shorter than their cells and about equal; basal cross-vein distant its own length from anterior cross vein; scales brown, the outstanding ones narrowly ligulate, those on forks of second vein dense and broader. Halteres whitish, with blackish knobs.

Legs slender, moderately long; vestiture dull bronzy brown with a bluish luster; femora beneath yellowish-white to near tips; under sides of front and mid tibiæ and first tarsal joints narrowly white scaled. Claw formula, 1.1–1.1–1.1.

Length: Body about 4 mm.; wing 3.5 mm.

Male.—Proboscis straight, long and rather slender; vestiture dark bronzy brown. Palpi exceeding the proboscis by nearly the length of the last joint; end of long joint and two last joints slightly swollen and with dense, long brown hairs. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, pale, narrowly ringed with black at insertions of hair-whorls; hairs long, dense and brown; tori entirely blackish. Coloration similar to the female, the scales on the mesonotum much paler, brassy. Abdomen elongate, depressed; dorsal segmental white bands broad; lateral ciliation fine, long and abundant, pale yellow. Wings narrower than in the female; stalks of the fork-cells longer, the vestiture sparse. Claw formula, 2.1–2.1–1.1.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 29, fig. 197): Side-pieces three times as long as wide, small at tip; apical lobe roundedly prominent, basal small, rounded, densely setose, with a stout curved spine within. Clasp-filament slender, slightly swollen in middle, with a long articulated terminal spine. Harpes narrowly elliptical, concave, inner margin thickened and revolute, tip pointed and recurved. Harpagones with a slender columnar minutely pilose stem, with a terminal articulated filament, which is widened in middle and bears a retrose spine with a small denticle below it. Unci contiguous, revolute, forming a moderate basal cone. Basal appendages small, bearing two stout spines.

Larva, Stage IV (plate 120, fig. 415).—Head rounded, widest through eyes, narrowed anteriorly, front arcuate. Antennæ moderate, slender, uniform, minutely spinulated, a small tuft situated near middle. Both pairs of dorsal head-hairs single, ante-antennal tufts in fives. Body with the skin smooth; lateral abdominal hairs single after second segment. Lateral comb of eighth

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segment of about twenty-five scales in a narrow patch, each scale broad, with a rather short central spine and long lateral fringe. Air-tube about two and a half times as long as wide, tapering outwardly; pecten of twelve to fourteen stout teeth, reaching about to the middle of the tube, with an ample hair-tuft situated near base of last tooth. Anal segment longer than wide, ringed by the plate; dorsal tuft a long hair and tuft on each side; lateral hair single; ventral brush well developed, confined to the barred area; anal gills long, tapering to sharp points, equal.

Dr. Grabham bred the larvæ from temporary puddles of rain-water.

Island of Jamaica.

Kingston, July 10, 1906 (M. Grabham).

As remarked in the discussion of *Aëdes bracteatus*, the species *tortilis* represents in Jamaica that Cuban species. Theobald states that Dr. Grabham has noted that the adults when at rest elevate the hind feet over the head like the sabethines. This unusual habit has been observed by Dr. Dyar in the case of *Aëdes pertinax* and seems to be peculiar to these insular forms. None of the many other culicines we have observed in life hold their legs in the manner characteristic of sabethines.

AEDES BALTEATUS Dyar & Knab.

Aëdes balteatus Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 9, 1907.
Aëdes balteatus Theobald, Mon. Culic., v, 485, 1910.

ORIGINAL DESCRIPTION OF AËDES BALTEATUS:

Proboscis black; palpi black; head behind the eyes pale bronzy, a large dark spot on each side; thorax bronzy yellow on the disk, a rounded deep brown patch on the front of the lateral margin, scutellum silvery. Abdomen black above, with narrow basal pale bands; beneath pale, the hind angles of the segments black. Legs black, unbanded, femora pale beneath. Tarsal claw formula of the female, 1.1–1.1–0.0.

6 specimens, Santo Domingo, West Indies (A. Busck).

***Type.*—Cat. no. 10152, U. S. Nat. Mus.**

Closely resembling *Aëdes auratus* Grabham, but the claws of the hind tarsi are simple.

DESCRIPTION OF FEMALE OF AËDES BALTEATUS (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather long, subcylindrical; labellæ conically tapered; vestiture black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-sixth as long as the proboscis, clothed with black scales and moderate, stiff bristles. Antennæ filiform, the joints subequal, rugose, pilose, black; second joint slightly thickened, fusiform, yellow, dark at apex; tori subspherical, with a cup-shaped apical excavation, luteous, blackish within, with a patch of fine black hairs; hairs of whorls moderate, sparse, black. Clypeus rounded triangular, depressed, with a slight median groove, nude. Eyes bronzy-black. Occiput black, clothed broadly with narrow curved scales on the vertex, flat ones on the sides, pale coppery-golden medianly and along eye-margins, a large black patch on the sides, many erect, forked, pale yellow scales well back on the nape; setæ along margins of eyes black, those projecting between eyes pale yellow.

Prothoracic lobes elliptical, remote dorsally, dark brown, concolorous with sides of mesonotum, with whitish scales and numerous black bristles. Mesonotum dark brown, clothed with narrow, curved scales, coppery golden in a broad median area, laterally produced behind middle and marked with dark brown in two indistinct narrow longitudinal lines, a distinct, deep brown, lateral rounded patch at anterior third surrounded by golden scales and a pair of small deep brown spots before antescutellar area; scales about antescutellar space and over roots of wings paler; setæ rather short, black. Scutellum trilo-

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bate, brown, clothed with narrow, curved dull golden scales, each lobe with a group of blackish bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ brown, coxæ luteous, clothed with patches of elliptical white scales and rows of pale bristles.

Abdomen subcylindrical, somewhat flattened, tapering posteriorly; dorsal vestiture black with a slight metallic reflection, very narrow incomplete bands of sordid white scales at bases of segments, obsolete outwardly, a row of triangular lateral basal segmental yellowish white patches; first segment black-scaled, a few pale ones laterally, and many fine pale yellowish hairs; venter yellowish-white scaled. Cerci black.

Wings rather broad, hyaline; petioles of second marginal and second posterior cells shorter than their cells and about equal; basal cross-vein distant nearly its own length from anterior cross-vein; scales brown, the outstanding ones narrowly ligulate, dense and broader on forks of second vein. Halteres blackish, with whitish knobs.

Legs slender, moderately long; vestiture bronzy-black with a bluish luster; femora beneath yellowish-white except at tips, under sides of fore and mid tibiæ narrowly whitish scaled. Claw formula, 1.1–1.1–1.1 or 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Life history and habits unknown.

Island of Santo Domingo.

Santo Domingo, August, 1905 (A. Busck).

As remarked in the discussion of *Aëdes bracteatus*, this species is the representative in Santo Domingo of that Cuban species. The claws of the hind legs may be either toothed or simple. The tooth, when present, is very delicate and easily escapes observation. There is considerable variation in coloration. On the mesonotum the deep brown coloration sometimes extends all along the sides, being indented behind the middle by the golden median area.

AËDES LEUCOMELAS (Lutz).

Hæmagogus leucomelas Lutz in Bourroul, Mosq. do Brasil, 47, 66, 1904.
Stecogonops leucomelas Lutz, Imprensa Medica, 1905, 101, 1905.
Hæmagogus leucomelas Theobald, Mon. Culic., iv, 551, 1907.
Stegoconops leucomelas Peryassú, Os Culic. do Brazil, 169, 1908.
Hæmagogus leucomelas Theobald, Mon. Culic., v, 493, 1910.
Stegoconops leucomelas Theobald, Mon. Culic., v, 606, 1910.

ORIGINAL DESCRIPTION OF STEGOCONOPS LEUCOMELAS:

FEMEA: Comprimento total 4.5 mm., menos a tromba que mede 2 mm.

Tromba—Muito delgada e de grossura igual em todo o comprimento, preta com o apex dos labellos um pouco amarellado, coberta de escamas muito appostas, pretas, com brilho azul escuro; na haste e nos labellos só ha pellos muito curtos e finos; apenas na raiz, do lado de baixo, ha alguns pellos maiores.

Palpos—Geralmente um tanto erectos, com escamas de azul metallico muito escuro, e pellos pretos.

Clypeus—Preto com brilho branco.

Frons e vertex anterior com algumas escamas estreitas, compridas e curvadas e alguns pellos inclinados para diante; ambos dourados.

Antennas—Os tori pretos, com brilho branco, mostrando no lado interno pequenas escamas e pellos finos e curtos; o flagello é preto com anneis brancos nas articulações; algumas escamas espatuladas escuras na base, principalmente do lado interno; os verticillos são pouco visiveis, sendo formados por pellos finos e escuros.

Occiput—Coberto de escamas chatas, obovaes ou espatuladas, imbricadas e dirigidas para diante; formam no meio uma large faxa branco-nacarada, principiando no vertex, na altura das margens posteriores dos tori e terminando na cervix, de modo a deixar lugar a uma colleira geralmente pouco visivel, formada por escamas erectas e bifurcadas, de côr escura; ao lado da faxa branca ha escamas de azul metallico escuro, as quaes nas regiões lateraes e mental são substituidas por outras branco-nacaradas, sendo a linha de separação obliqua.

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Lobulos prothoracicos—Com fundo e pellos pretos, coberto de escamas branco-nacaradas, iguaes ás do occiput, que se extendem sobre as coxas do 1º par, formando uma faxa branca; parallelas a esta ha sobre as pleuras e coxæ dos pares posteriores outras duas faxas brancas, verticaes sobre o eixo do thorax e separadas por estrias pretas; estas tres faxas são muito caracteristicas e distinguem a especie de todas as outras, conhecidas e encontradas entre nós.

Mesonotum—Na linha mediana ha algumas escamas brancas no apex do thorax e no scutellum; no resto o fundo preto é coberto de escamas muito escuras, fusiformes ou obovaes alongadas; encontram-se tambem no scutellum que tem no lobo medio 4 pellos compridos e outros poucos nos lobos lateraes; é coberto de escamas obovaes.

Metanotum—Preto com brilho alvacento.

Abdomen—Em cima o fundo ochraceo é coberto de escamas com brilho azul, que são separadas em baixo e dos lados por cintas basaes branco-nacaradas; estas são interrompidas no meio e nas membranas lateraes: nos ultimos segmentos podem estender-se até na face dorsal; o abdomen é lateralmente comprimido, assumindo uma forma prismatica, sendo uma face formada pelo plano dorsal; os apices dos segmentos 7, 8 e 9 são salientes em baixo, na linha mediana, de modo a formar uma escada; ha muitos pellos dourados-pallidos, distribuidos irregularmente sobre todos os segmentos e mais abundantes no 1º e nas margens apicaes dos outros.

Pernas—Escuras, cobertas com escamas de brilho metallico azul e roxo escuro e espinhos espaçados, tambem escuros; no ultimo par ha muitas escamas alongadas e um pouco salientes, principalmente do lado interno do apex da tibia e da base do metatarso; os quatro *femora* anteriores lateralmente comprimidos, com algumas escamas pallidas, ligeiramente douradas na metade basal e inferior; no ultimo par a base e a maior parte do lado inferior são de côr ochracea com escamas bancas; no par medio ha uma mancha branca no apex do femur e no limite do segundo e ultimo terço, ambos situados na face anterior e mais uma igual no lado de diante do apex do femur posterior.

Unhas dos quatro pés anteriores maiores e com um dente na base; os ultimos menores e inermes.

Azas—Na base da costa e das primeiras nervuras longituninaes predominam escamas curtas, largas e espatuladas, de côr mais escura com reflexos azues e roxos; no resto das azas predominam escamas cinzentas, parecidas com as observadas no genero culex; primeira cellula forqueada muito maior, a segunda quasi igual ao pedunculo correspondente; veias *a* e *b* encontram-se em angulo obtuso aberto para a base, da qual *c* se approxima por cerca de 2 vezes o seu comprimento.

Halteres—Ochraceos; o capitulo com escamas geralmente escuras, substituidas por branco nacarado na face terminal.

O macho distingue-se pelas antennas muito plumosas, tendo os dois ultimos articulos compridos e os pellos maiores escuros com brilho alvacento.

Os palpos compridos e finos, um pouco menores que as trombas, têm o 1º articulo muito curto e os outros de tamanho variavel, augmentam em comprimento segundo a ordem—5º 4º 3º; a côr é escura com um pouco de brilho azulado; não ha tufos, mas apenas pellos finos espaçados e pouco maiores no 3º e 4º articulo.

Unhas anteriores desiguaes e bastante grandes, com dentes na base.

NOTA.—Esta especie silvestre foi encontrada nos estados de S. Paulo e Rio de Janeiro, principalmente nas serras até uma elevação de 1500 metros.

Apresenta affinidades com Carrollia e Haemagogus; de stegomyia, á qual se approxima, distingue-se mórmente pela conformação do abdomen.

DESCRIPTION OF FEMALE AND MALE OF AËDES LEUCOMELAS (LARVA UNKNOWN):

Female.—Proboscis long and rather slender, cylindrical, labellæ conically tapered; vestiture blue-black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi small, about one-eighth the length of the proboscis; vestiture blue-black; setæ moderate, stiff. Antennæ filiform, slender, the joints subequal, rugose, pilose, brown; second joint somewhat thickened apically; tori subspherical, with a cup-shaped apical excavation, blackish; hairs of whorls sparse, rather long. Clypeus roundedly triangular, depressed, black, shining, nude. Eyes well separated in front, black. Occiput clothed entirely with broad, flat triangular scales, black with a blue reflection, silvery-white in a narrow median dorsal line, along margins of eyes and on sides below; the silvery-white scales continued forward between the eyes; some forked erect black scales far back on nape; setæ along margins of eyes black, the median ones lacking.

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Prothoracic lobes elliptical, prominent, separated dorsally by their own width, black, clothed with silvery-white scales and coarse black bristles, apical angles with violet-black scales. Mesonotum black, clothed with narrow, elliptical, blue-black scales and a narrow mid-dorsal line of broader silvery-white scales, the line continued over the antescutellar space; a silvery-white patch below anterior angles and one at margins before roots of wings, continuous with pleural vestiture. Scutellum trilobate, with black scales except on the middle lobe on which the white mesonotal stripe is continued; each lobe with a small group of dark brown bristles. Postnotum short, elliptical, blackish brown, shining, nude. Pleuræ and coxæ black-brown, clothed with patches of silvery-white scales and rows of dark bristles.

Abdomen subcylindrical, flattened, slightly tapering posteriorly, ventrally produced into a median longitudinal ridge and with the sixth and seventh segments apically expanded, eighth segment small; dorsal vestiture black with a violet-blue reflection, a series of large, lateral, triangular silvery-white patches, those on last four segments dorsally produced, nearly joining medianly on the sixth, and joining on the seventh and eighth segments to form subbasal bands; first segment with black scales and fine pale hairs; venter with basal half of segments silvery-white, apical half black, last segment entirely black.

Wings rather narrow, hyaline; petiole of second marginal cell half as long as its cell, that of second posterior cell longer than its cell; basal cross-vein more than its own length distant from anterior cross-vein; scales deep brown, bluish along costa, small and narrow, the outstanding ones narrowly ligulate, denser on second vein and broader towards tip of wing. Halteres luteous, with black, white scaled knobs.

Legs slender, rather long; vestiture blue-black, slightly outstanding at ends of tibiæ; front femora entirely dark scaled; mid femora white beneath on basal two-thirds, expanded at that point to nearly encircle femur, apices broadly silvery-white; hind femora pale beneath and on outer side to apical fourth, apically broadly silvery-white scaled; knees of front legs narrowly white scaled. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3 mm.

Male.—This sex is not represented in the National Museum. Dr. Peryassú says that the antennæ are very plumose, the last two joints long; the palpi are black, long, and slender, slightly shorter than the proboscis, with some scattered long hairs on the outer portion; the claws of the front and middle tarsi are unidentate, those of the hind simple.

Dr. Peryassú found the larvæ in a tin, associated with *Limatus durhamii* and *Aëdes calopus*. Dr. Lutz collected them in bamboo, Mr. Urich and Mr. Jennings from tree-holes, but unfortunately neither obtained a larval skin.

Forested regions of tropical America.

Alhajuela, Chagres River, Canal Zone, Panama, March 18, 1909, larvæ associated with *Aëdes thorntoni* (A. H. Jennings); Caldera Island, Porto Bello Bay, Panama, May 23, 1908 (R. L. Turner); Trinidad, June 6, 1906 (F. W. Urich); Rio Charape, Peru, September 18, 1911 (C. H. T. Townsend). Also reported from the States of São Paulo, Rio de Janeiro and Minas Geraes, Brazil (Lutz, Peryassú).

AËDES PODOGRAPHICUS Dyar & Knab.

Aëdes insolita Dyar & Knab (not Coquillett), Journ. N. Y. Ent. Soc., xiv, 203, 1906.
Aëdes insolita Dyar (not Coquillett), Proc. Ent. Soc. Wash., viii, 16, 1906.
Verrallina insolita Coquillett (in part, not Coquillett), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 17, 1906.
Aëdes podographicus Dyar & Knab, Proc. Biol. Soc. Wash., xix, 165, 1906.
Aëdes podographicus Theobald, Mon. Culic., v, 484, 1910.

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ORIGINAL DESCRIPTION OF AËDES PODOGRAPHICUS:

♂. Thoracic ornamentation similar to the ♀. Thorax black, silvery scaled on the sides before the wings. ♀. First joint of middle tarsi white, a black spot at the middle, not black, white at the ends.

This is the Central American form referred to by us as *Aëdes insolita* Coquillett under Mr. Coquillett's determination (Journ. N. Y. Ent. Soc., XIV, 203, 1906), but it appears from a nice bred series sent us by Mr. F. W. Urich, that *insolita* (which was described from Trinidad) is the female of the species of which *Verrallina laternaria* Coquillett is the male, the sexes being dimorphic. The species will be known as *insolita* Coquillett. In *podographicus* the sexes are monomorphic.

The larvae were separated by us on the shape of the antennae; but as this character is rather indefinite, it will be better to change the table, omitting the dichotomy 40, placing *podographicus* with *insolita* under 44, and separate them by the shape of the pecten of the air tube as shown in our figures 17 and 20, figure 17 representing *insolita* and figure 20, *podographicus*.

Localities as given by us under *Aëdes insolita* (*Verralina insolita* Dyar & Knab, not Coquillett). Sonsonate, Salvador may be considered the type locality.

Type.—Cat. No. 10,016, U. S. Nat. Mus.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES PODOGRAPHICUS:

Female.—Proboscis rather long, subcylindrical, uniform; labellæ conically tapered; vestiture black; setæ short, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fourth as long as the proboscis, rather slender; vestiture black, setæ moderate. Antennæ filiform, the joints subequal, rugose, pilose, black, pale at base; second joint somewhat thickened towards middle; tori subspherical with a cup-shaped apical excavation, blackish; hairs of whorls moderate, sparse, black. Clypeus rounded triangular, convex, blackish-brown, shining, nude. Eyes black. Occiput blackish, clothed medianly with rather broad curved scales, broader fat ones on the sides, dark brown, a line of silvery-white ones along margins of eyes and on the cheeks white; many erect forked black scales on the nape; setæ along margins of eyes black, some pale ones projecting between eyes.

Prothoracic lobes elliptical, remote dorsally, blackish, with broad silvery scales and brownish-black bristles. Mesonotum dark brown, clothed with narrow, curved, bronzy-brown scales, a large angular patch of silvery-white much broader scales on anterior half of lateral areas, broadening posteriorly and squarely terminated; a small silvery spot on margins in front of insertions of wings, some pale scales about antescutellar space; bristles over roots of wings and about antescutellar space long, brown. Scutellum trilobate, blackish, each lobe clothed with narrow, curved, silvery-white scales and with a group of brownish yellow bristles. Postnotum elliptical, prominent, blackish brown, nude. Pleuræ black, coxæ brownish luteous, clothed with patches of elliptical silvery-white scales and rows of pale bristles, a large silvery-white patch on anterior angles continuous with that on dorsum.

Abdomen subcylindrical, flattened, tapering posteriorly, sixth and seventh segments apically expanded beneath; dorsal vestiture purplish-black, a row of lateral, basal, segmental silvery-white patches, extending to or beyond middle of segments, their apical angles dorsally produced; first segment purplish-black scaled and with many fine pale hairs; venter black scaled, banded with silvery white at bases of segments. Cerci black.

Wings rather broad, hyaline; petiole of second marginal cell much shorter than its cell, that of second posterior cell also slightly shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales deep brown, with a bluish reflection along the costa, the outstanding ones of veins ligulate, denser toward tip of wing. Halteres whitish, with darker knobs.

Legs rather long and slender; vestiture blue-black; femora beneath on basal half silvery white, tips also narrowly white beneath; middle femora narrowly,

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hind ones broadly silver tipped; fore tarsi with minute white spots at bases of first and second joints and apex of first; mid tarsi with first joint white, broadly ringed with black before middle, second joint white on basal half; hind tarsi with apical third of first joint and basal two-fifths of second joint white. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 4 mm.

Male.—Proboscis moderately long and slender, straight, violet-black scaled. Palpi as long as the proboscis; end of long joint somewhat thickened, the last two joints rather short, slender, but slightly thickened; terminal hairs moderate, rather sparse, black; vestiture blackish throughout. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, sordid-luteous, ringed with black at insertions of hair-whorls; hairs of whorls long, dense, brownish-black. Coloration similar to the female; antero-lateral silvery-white patches of mesonotum larger and fused with ante-alar ones. Abdomen elongate, subcylindrical, ventrally produced into a keel, the sixth and seventh segments apically expanded beneath; lateral ciliation short, rather sparse and irregular, dull luteous; eighth segment with silvery-white basal band above. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture less abundant. Claw formula, 2.1–2.1–0.0.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 32, fig. 216): Side-pieces over twice as long as wide, rounded at tips, apical and basal lobes absent. Clasp-filament small, slender, with an articulated terminal spine half as long as filament. Harpes elliptical, concave, inner margin revolute, tip pointed and recurved. Harpagones with a columnar base bearing a terminal, articulated, long, narrowly ligulate filament. Unci approximate, revolute, forming a large basal cylinder. Basal appendages very short, bearing five spines.

Larva, Stage IV (plate 121, fig. 420).—Head rounded, slightly narrowed before eyes, a slight notch at insertion of antennæ, front margin broadly arcuate. Antennæ moderate, slender, cylindrical, slightly curved, very slightly spined, almost smooth; a single hair near middle; two long spines, two short ones, and an apical digit. Eyes large, pointed. Both pairs of dorsal head-hairs single, ante-antennal tuft multiple. Mental plate triangular, with a central tooth and eleven on each side, basal ones slightly more remote. Mandible quadrangular, elongate, with short basal spines; two filaments before tip; an outer row of cilia from a collar; outer margin very oblique, with a row of filaments near the collar; dentition of four teeth on a process, the first longest; two spines before, three teeth at base, a broad filament and six slender ones within; process below slender, furcate, upper limb thick and rounded with a long hair-tuft at tip, lower limb slender; a row of hairs from base of incision to below the dentition; basal angle sharp; a row of hairs within; a row of hairs at base. Maxilla rounded quadrate, elongate, divided by a suture; inner half with a row of sharp spines on the edge and a median oblique row of cilia, a hair-tuft at tip; outer half with a pair of filaments about the middle, arising from a process which overlaps the suture; palpus small, with the terminal digits irregular. Thorax rounded, wider than long; subdorsal prothoracic hairs multiple. Abdomen moderate, anterior segments shorter; lateral hairs of first segment multiple, double on second to sixth. Air-tube stout, tapering outwardly, about two and a half times as long as wide; pecten evenly spaced, running beyond middle of tube, followed by a single tuft of three hairs; single pecten-tooth a long spine with a short basal branch. Lateral comb of eighth segment of many scales in a triangular patch; single scale elongate, conical, smooth. Anal segment about as long as wide, with a dorsal plate reaching well down the sides, narrowly in-

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dented on lateral margins; dorsal tuft a hair and brush on each side; a lateral tuft of four hairs at hind angle of plate; ventral brush well developed; anal gills moderate, ensiform, a little longer than the segment.

The larvæ live in the water in tree-holes. Mr. Knab found them in water in a hollow place between the main branches of a mango tree, in a tree a foot in diameter with a small hole containing dark water like coffee in color, in a hole between two diverging trunks of a tree nearly level with the ground, in a hole in a small tree on the bank of a river, holes in the roots of a large tree and in a tree with a hollow formed by a division of the trunk.

West coast region of Mexico and Central America.

Las Peñas, State of Jalisco, Mexico (A. Dugès); Tehuantepec, State of Oaxaca, Mexico, July 1, 1905 (F. Knab); Salina Cruz, State of Oaxaca, Mexico, July 15, 1905 (F. Knab); Almoloya, State of Oaxaca, Mexico, July 22, 1905 (F. Knab); Sonsonate, Salvador, August 18, 1905 (F. Knab); Las Loras, near Puntarenas, Costa Rica, September 9, 1905 (F. Knab).

Aëdes podographicus is closely related to *Aëdes oswaldi* and *A. thorntoni*, the three species being separable on minor characters. The species before us does not show the well-marked sexual dimorphism in the thoracic coloration which is so conspicuous in *Aëdes oswaldi*.

AËDES OSWALDI (Lutz).

Gualteria oswaldi (nomen nudum), Lutz in Bourroul, Mosquitos do Brasil, 47, 1904.
Hæmagogus oswaldi Lutz, in Bourroul, Mosquitos do Brasil, 66, 1904.
Gualteria oswaldi Lutz, Imprensa Medica, 25 Feb. 1905, 65, 1905.
Gualteria oswaldi Blanchard, Les Moustiques, 633, 1905.
Verrallina insolita Coquillett, Can. Ent., xxxviii, 62, 1906.
Verrallina laternaria Coquillett, Proc. Ent. Soc. Wash., vii, 184, 1906.
Aëdes laternaria Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 202, 1906.
Aëdes laternaria Dyar, Proc. Ent. Soc. Wash., viii, 17, 1906.
Hæmagogus oswaldi Dyar & Knab, Proc. Biol. Soc. Wash., xix, 166, 1906.
Verrallina insolita Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 17, 1906.
Verrallina laternaria Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 17, 1906.
Gualteria oswaldi Theobald, Mon. Culic., iv, 552, 1907.
Gualteria oswaldoi Peryassú, Os Culicideos do Brazil, 45, 64, 177, 1908.
Gualteria oswaldi Theobald, Mon. Culic., v, 606, 1910.
Verrallina (?) insolita Theobald, Mon. Culic., v, 496, 1910.
Verrallina (?) laternaria Theobald, Mon. Culic., v, 496, 1910.

ORIGINAL DESCRIPTION OF GUALTERIA OSWALDI:

(FEMEA): Comprimento total 5 a 6 mm., sem a tromba que mede 3 mm.

Tromba—Escura, com brilho azul, bastante comprida, do tamanho do abdomen, linear, entumescida no apex, com muitos pellos curtos.

Clypeus—Castanho escuro, com brilho esbranquiçado.

Antennas—Tori castanho claro, ennegrecidos do lado interno onde ha pellos pequenos e curtos; flagellos compridos, quasi do tamanho da tromba, com verticillos escuros, pellos menores alvacentos e anneis articulares brancos.

Palpos—Cinco articulos, (o ultimo muito pequeno), cobertos de escamas escuras com brilho azul.

Occiput—Escamas fusiformes curvas, estreitas, de côr crême na margem dos olhos e na linha mediana; ao lado d'esta são mais largas, côr de bronze escuro; nas regiões lateraes e mental ha escamas chatas branco-nacaradas; no meio do occiput e no cervix ha tambem muitas escamas erectas, compridas e estreitas, com a ponta bifurcada, côr de ouro.

Lobulos prothoracicos—Pellos amarellos sobre fundo castanho escuro; dos lados ha escamas chatas, obovaes e branco nacaradas.

Mesonotum—Fundo castanho ennegrecido, no meio com escamas fusiformes, estreitas, compridas e curvadas, de côr dourada e bronzeada; para traz tornam-se de côr crême e para os lados são substitudias por outras mais largas e branco-nacaradas.

Pleuras—Escamas espatuladas, branco-nacaradas sobre fundo castanho escuro, formando nas pleuras e coxæ cerca de 9 grupos, apparecendo como pequenas manchas prateadas, de forma variavel.

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Scutellum—As escamas são muito caducas, eguaes ás do thorax; ha outras escuras e espatuladas; o lobo medio com 4 pellos compridos sub-terminaes.

Metanotum—Escuro, brilhante, quasi preto no meio.

Abdomen—Achatado em cima e lateralmente comprimido na porção apical, com tres saliencias em baixo, formadas pelas margens apicaes dilatadas do 5º, 6º, e 7º segmentos; cobertos de escamas mais compridas e numerosos pellos amarellos; a região dorsal tem o fundo preto, densamente coberto por escamas escuras, chatas e imbricadas, com reflexos azues e esverdeados; em baixo ha escamas eguaes, sendo, porém, os dois primeiros segmentos brancos e os outros marcados com cintas basaes brancas; nos segmentos 6, 7 e 8 continuam-se em manchas brancas lateraes; o 8º segmento é muito mais estreito, destituido de escamas na parte apical e ventral, onde apparece o fundo amarellado; o ultimo segmento é muito miudo, geralmente quasi escondido.

Pernas—São de côr escura, com brilho azulado e bronseado e com algumas cintas esbranquiçadas, que são situadas do seguinto modo: no primeiro par ha aneis na base do metatarso e do primeiro tarso; no segundo, na base e no apex do metatarso e na base do primeiro tarso; esta longa cinta é interrompida por espinhos pretos e algumas escamas escuras no apex do metatarso, formando macroscopicamente uma linha preta; no terceiro par ha escamas brancas no base do metatarso e cintas brancas no apex d'este e na base do primeiro tarso, separadas por espinhos e escamas escuras; todos os joelhos são marcados de branco, o que se percebe pouco no primeiro par; no segundo e terceiro o femur tem uma cinta apical branca: nos pares anteriores o femur é lateralmente achatado e curvado sendo a parte basal branca em baixo; no terceiro par a metade basal é branca tanto em cima como em baixo. As unhas são finas, bastante compridas, principalmente nos dois primeiros pares.

Asas—Bastante escuras, com escamas lateraes cinsentas parecidas ás do culex; na base da costa ha algumas mais largas, de côr branca: a primeira cellula forqueada, duas vezes maior que o pedunculo, é bastante maior do que a segunda; esta é mais ou menos egual ao seu pedunculo; as veias tranversaes *a* e *b* encontram-se em angulo muito obtuso, aberto para a base da aza, da qual *c* se approxima por quasi duas vezes o seu comprimento.

Halteres—Amarellos, com escamas brancas, mais escuras na face terminal do capitulo.

NOTA.—Esta especie silvestre e hematophaga foi encontrada nos estados do Rio de Janeiro, Minas e S Paulo, até uma altura de 1500 metros e geralmente em pequeno numero. Dedico-a ao Dr. Oswaldo Cruz, actualmente director do Serviço Sanitario do Rio de Janeiro, de quem recebi o primeiro exemplar desta nova especie. O culex terrens de Walker considerado stegomyia por Theobald, talvez tenha de entrar neste genero, mas não pode ser identificado á nossa especie. O genero Gualteria, é dedicado ao major Walter Reed ao qual se deve em grande parte a prova da transmissão da febre amarella pela stegomyia fasciata. E' bastante caracterisado pela conformação das escamas do occiput, thorax e das azas e pelos caracteres do abdomen, mas falta o conhecimento do macho para se ter difinição completa.

ORIGINAL DESCRIPTION OF VERRALLINA INSOLITA:

Proboscis and palpi black scaled, occiput white scaled around the edge, yellow scaled in the centre, and with a pair of black scaled spots on the upper half. Thorax black scaled in the middle, the sides in front of the wings broadly, and spots on the pleura, white scaled. Abdomen black scaled, with a tinge of purple, middle of venter, except on the broad apices of the last four segments, white scaled, extending outwardly considerably on these segments. Legs black scaled, the under side of the front and middle femora towards the base, and the whole of the hind femora except the base and a broad band beyond the middle, white scaled; narrow bases of first three joints of the front and middle tarsi, both ends of the first joint and base of the second joint of the hind tarsi white scaled; claws of the front and middle tarsi toothed, those of the hind ones simple. Wings hyaline, the scales brown. Length nearly 4 mm.

Trinidad, West Indies. A female collected by Mr. F. W. Urich. Type No. 9142, U. S. National Museum.

ORIGINAL DESCRIPTION OF VERRALLINA LATERNARIA:

Scales of proboscis black, palpi of male about as long as the proboscis, their hairs and scales black; occiput densely white-scaled and with a patch of black ones each side. Mesonotum densely covered with white scales, its bristles and those of the scutellum yellow. Abdomen black-scaled, a patch of white scales in the front angles of each segment, largest on the last three segments. Legs black-scaled, the apices of the middle femora and whole of the hind ones, except the base and a band

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before the apex, white-scaled; both ends of the first joint of the middle and hind tarsi, covering nearly the entire joint on the middle tarsi, and base of the second joint, white-scaled; claws of front and middle tarsi with one tooth under one of the claws, none under the other, claws of hind tarsi simple. Wing-scales brown. Length 3.5 mm.

Trinidad, West Indies. Five males collected by Mr. August Busck.

Type.—No. 8290, U. S. National Museum.

The genus Verrallina Theobald was founded on female specimens only and was referred by its author to the subfamily Aëdeomyinæ, but the present species clearly belongs to the Culicinæ.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES OSWALDI:

Female.—Proboscis rather long, slender, subcylindrical, uniform; labellæ conically tapered; vestiture black; setæ short, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth as long as the proboscis, rather slender; vestiture, black, the setæ moderate. Antennæ filiform, the joints subequal, rugose, pilose, black; tori subspherical with a cup-shaped apical excavation, brown; hairs of whorls moderate, sparse, black. Clypeus rounded, triangular, depressed, blackish-brown, nude. Eyes black. Occiput blackish, clothed with rather broad, curved scales, broader flat ones on the sides, silvery white, a small black patch well up the sides near eye-margin, many erect forked pale scales on the nape; setæ along margins of eyes black, those projecting between eyes pale.

Prothoracic lobes elliptical, remote dorsally, blackish, with broad silvery scales and brownish-black bristles. Mesonotum dark brown, clothed with narrow, curved dark bronzy-brown scales, anterior halves of lateral areas covered by large patches of silvery-white broader scales which are divided by a narrow median stripe and narrowly continued along margins to roots of wings; a very narrow median white line between the humeral patches. Scutellum trilobate, blackish, clothed with narrow curved dark brown scales, each lobe with a group of brownish-black bristles. Postnotum elliptical, prominent, blackish brown, nude. Pleuræ black, coxæ brownish luteous, clothed with patches of elliptical silvery white scales and rows of dark bristles.

Abdomen subcylindrical, flattened anteriorly, tapering and compressed posteriorly, the venter with a median ridge and with the fifth, sixth and seventh segments apically expanded; dorsal vestiture violet-black, a row of lateral, segmental, basal silvery-white patches, their dorso-apical angles near middles of segments; venter black-scaled, banded with silvery white at bases of segments. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell also slightly shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales dull brown, costa with a bluish reflection, a line of silvery scales at base extending about one-seventh the wing-length; the outstanding scales of veins narrowly ligulate, those on forks of second vein dense and broader. Halteres whitish.

Legs slender, rather long; vestiture violet-black; front and mid femora with a silvery-white line beneath except at extreme base and apical third, mid pair silvery-white at apices; hind femora white, with a narrow black ring near base and a broad one near apex, the apex broadly silvery-white; fore tarsi with a minute white spot at base and tip of first and at base of second joint; mid tarsi with the first joint white, very broadly ringed with black mesially, the second joint white on basal third; hind tarsi with apical fourth of first joint and basal third of second joint white, a white spot at base of first joint. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 4 mm.

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Male.—Proboscis straight, long and slender, bronzy-black scaled. Palpi nearly as long as the proboscis; end of long joint and last two joints slender, but slightly thickened and with the hairs moderate, rather sparse, black; vestiture bronzy-black. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, sordid-luteous, ringed with black at insertions of hair-whorls; hairs of whorls long, abundant, dark brown. Coloration similar to the female. Occiput entirely silvery-white scaled. Mesonotum completely overspread with silvery white, except at posterior end where there are traces of brown scales. Abdomen elongate, depressed, with a median dorsal ridge which fades out posteriorly; lateral silvery-white spots of fifth, sixth and seventh segments on dorsal surface; eighth segment dorsally silver-scaled; lateral ciliation rather short, coarse, pale. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture less abundant. Claw formula, 2.1–2.1–0.0.

Length: Body about 5 mm.; wing 4 mm.

Genitalia (plate 33, fig. 221): Side-pieces over twice as long as wide, rounded at tips, apical lobe absent, basal lobe a rounded area bearing numerous setæ with tubercular bases. Clasp-filament small, slender, with an articulated terminal spine half as long as the filament. Harpes elliptical, concave, inner margin revolute, tip pointed and recurved. Harpagones with a short columnar base bearing a long fine seta near tip and a terminal articulated long narrowly ligulate filament. Unci approximate, revolute, forming a large basal cylinder. Basal appendages very short, bearing three rather long spines.

Larva, Stage IV (plate 119, fig. 409).—Head rounded, widest through eyes, narrowed before, a notch at insertion of antennæ, front margin arcuate. Antennæ moderate, slender, with a few small spines and a single hair before middle; a long and a short subapical spine, two moderate apical ones and a digit on a pedicel. Both pairs of dorsal head-hairs double, ante-antennal tuft multiple. Mental plate triangular, with a central tooth and ten on each side, the two basal ones small and remote. Mandible quadrangular, with a few spines at base; two filaments before tip; an outer row of cilia from a collar; a row of filaments on outer margin and a row of fine obscure hairs from coincident bases; dentition of four teeth on a long process, first and third slightly longer; a long spine and a short one before, a broad filament and a row of serrate hairs within; process below widely furcate, with a row of hairs down the middle extending below the dentition and a tuft at the tip of each limb; basal angle moderate, with a row of stout hairs within; a row of hairs at base. Maxilla elliptical, divided by a suture; inner half roundedly protuberant, with a double row of teeth on margin, long at apex and diminishing at base, a large patch of hairs within and a row of cilia near the suture, a row of long hairs at tip; outer half with two articulated filaments near middle, a small spine at apex and a few hairs toward base of palpus; palpus short and stout, with four rudimentary apical digits. Thorax rounded, wider than long. Abdomen moderate, the anterior segments shorter; lateral hairs in fives on first segment, in threes on second, in twos on third to sixth; subdorsal and ventral hairs in stellate tufts. Air-tube stout, tapered, about three times as long as wide; pecten reaching to the middle, the single tooth a long spine with a stout basal branch and one or two short serrations; a single small tuft of about five hairs beyond the pecten. Lateral comb of eighth segment of many scales in a triangular patch; single scale elongate, blunt, evenly fringed with spinules. Anal segment longer than wide, with a dorsal plate reaching well down the sides, shallowly emarginate on lateral margin; dorsal tuft a long hair and brush on each side; a lateral tuft of five long hairs; ventral brush well developed, with a few tufts preceding the barred area; anal gills about as long as the segment, roundedly tapered.

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The larvæ live in the water in holes in trees. Mr. Knab got them in a mango-tree in company with those of *Culex consternator*. Lutz states that the female sucks blood.

Tropical America; Mexico to South America east of the Cordilleras.

Córdoba, State of Vera Cruz, Mexico, March 7, 1908 (F. Knab); Montserrat, Trinidad, June 29, 1905 (A. Busck); Trinidad, November 18, 1905 (F. W. Urich); Corentyne River, Dutch Guiana (J. Aiken). Reported also from States of Rio de Janeiro, São Paulo and Minas Geraes, Brazil (Lutz, Peryassú).

Aëdes oswaldi, with *A. podographicus* and *A. thorntoni*, form a group of closely allied species, the larvæ of all of which inhabit hollow trees. The present species is remarkable in the striking sexual dimorphism in the thoracic ornamentation, which led Coquillett to describe the opposite sexes under different names.

AËDES THORNTONI Dyar & Knab.

Aëdes thorntoni Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 10, 1907.
Aëdes insolita Busck (not Coquillett), Smiths. Misc. Colls., quart. iss., iii, 64, 1908.
Aëdes thorntoni Theobald, Mon. Culic., v, 485, 1910.

ORIGINAL DESCRIPTION OF AËDES THORNTONI:

Proboscis and palpi black; head behind the eyes dark with a purplish luster, the margin of the eyes silvery, broadened at the sides; thorax violaceous black, the anterior portion silvery white for nearly half with a dark indentation at the middle; two small silvery spots near the hind margin. Abdomen above and beneath violaceous black, each segment with narrow silvery transverse bands below. Pleura silvery scaled. Fore legs deep black, first and second tarsal joints narrowly white at base; middle legs black, the femora marked with silver on the under side for about two-thirds the length, not attaining the base, apex silvery, base and tip of the first tarsal joint and base of the second broadly white; hind femora white, a black ring close to the base and another towards the apex, tibiæ black, first tarsal joint white-ringed at base and apex, second joint white-ringed at base. Tarsal claw formula of the female 1.1–1.1–0.0.

7 specimens, Bluefields, Nicaragua (W. F. Thornton).

Nearly allied to *Aëdes insolita* Coquillett and *Aëdes podographicus* Dyar & Knab, but differing from both in the details of the markings.

Type.—Cat. no. 10143, U. S. Nat. Mus.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES THORNTONI:

Female.—Proboscis slender, rather long, subcylindrical, uniform, labellæ conically tapered; vestiture black; setæ short, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth as long as the proboscis, rather slender; vestiture black, setæ moderate. Antennæ filiform, the joints subequal, rugose, pilose, black; tori subspherical, with a cup-shaped apical excavation, blackish; hairs of whorls moderate, sparse, black. Clypeus rounded triangular, depressed, blackish-brown, nude. Eyes black. Occiput blackish, clothed with rather broad curved scales, broader flat ones on the sides, black, margins of eyes narrowly silvery-white, lower part of sides silvery-white, many erect, forked, black scales on the nape; bristles along margins of eyes and those projecting between eyes pale.

Prothoracic lobes elliptical, remote dorsally, blackish, with broad silvery-white scales and brownish black bristles. Mesonotum dark brown, clothed with narrow curved dark bronzy-brown scales, anterior halves with extensive lateral patches of silvery-white broader scales, broadened and joined over the anterior margin, their posterior margins forming two rounded lobes which do not extend to roots of wings. Scutellum trilobate, middle lobe large and prominent, the side lobes small, blackish, clothed with narrow curved dark brown scales, each lobe with a group of brownish-black bristles. Postnotum elliptical, prominent,

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blackish-brown, nude. Pleurae brown, coxae luteous, clothed with patches of elliptical silvery-white scales and rows of dark bristles.

Abdomen subcylindrical, flattened anteriorly, tapering and compressed posteriorly, the venter with a median ridge and with the fifth, sixth and seventh segments apically expanded; dorsal vestiture bluish-black, a row of lateral, basal, quadrangular, segmental silvery-white patches; venter black-scaled, banded with white at bases of segments. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell also slightly shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales dull brown, costa with a bluish reflection, a short narrow line of white scales at its base, outstanding scales of veins narrowly ligulate, dense and slightly broader on second vein. Halteres whitish.

Legs slender, rather long; vestiture violet-black; fore femora black-scaled throughout; mid femora beneath broadly silvery white on basal three-fourths, tips rather broadly ringed with white; hind femora with a black ring at base and before tip; fore tarsi with a minute white spot at base of first joint; mid tarsi with first joint black, ringed with white at base and apex, second joint white on basal third; hind tarsi with base and apical fourth of first joint and basal third of second joint white-ringed. Claw formula, 1.1–1.1–0.0.

Length: Body about 3.5 mm.; wing 3.5 mm.

Male.—Proboscis straight, rather slender, black scaled. Palpi slightly shorter than the proboscis, slender; apex of long joint and two last joints slightly thickened and rather sparsely clothed with long black hairs; vestiture black, somewhat roughened. Antennae plumose, the last two joints long and slender, rugose, pilose, black, the others short, sordid luteous, ringed with black at insertions of hair-whorls; hairs of whorls long, dense, dark brown. Coloration similar to female. Occiput silver-scaled, with two small, dark subdorsal spots anteriorly. Mesonotum silver-scaled on anterior three-fifths, the hind margin of silvery area transverse, uninterrupted. Abdomen elongate, subcylindrical, the fifth, sixth and seventh segments apically expanded beneath; eighth segment dorsally silver-scaled, with black apical margin; lateral ciliation moderate, coarse, pale yellowish. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture less abundant. Claw formula, 2.1–2.1–0.0.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 32, fig. 217): Side-pieces over twice as long as wide, rounded at tips, apical lobe absent, basal lobe undeveloped. Clasp-filament small, slender, with an articulated terminal spine half as long as filament. Harpes elliptical, concave, the inner margin revolute, tip pointed and recurved. Harpagones with a short columnar base bearing a fine seta near the tip and a terminal articulated long narrowly ligulate filament. Unci approximate, revolute, forming a large basal cylinder. Basal appendages very short, bearing three rather long spines.

Larva, Stage IV (plate 118, fig. 405).—Head rounded, widest through eyes; antennae rather long, slender, uniform, smooth, a single hair near middle; both pairs of dorsal head-hairs single. Body with the skin smooth. Lateral comb of eighth abdominal segment of many scales in a patch, each scale with the margin evenly fringed, without differentiated central spine. Air-tube moderately stout, about three times as long as wide, tapering outwardly; pecten of fourteen teeth, reaching nearly to the middle, followed by a single small tuft of six hairs at a considerable interval. Anal segment longer than wide, with a dorsal plate reaching well down the sides; dorsal tuft a long hair and tuft on each side; lateral tuft small, five-haired; ventral brush well developed, with smaller tufts before the barred area; anal gills about as long as the segment, stout, tapering, equal.

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The larvæ live in the water in hollow trees and in broken bamboo. Mr. Busck and Mr. Jennings got them in such situations and Mr. Jennings also got them several times in his bamboo-traps.

Central America.

Bluefields, Nicaragua (W. F. Thornton); Chagres River, Panama, May 20, and June 7, 1907 (A. Busck); Caldera Island, Porto Bello Bay, Panama, June 1, 1908 (A. H. Jennings); Tabernilla, Canal Zone, Panama, July 30, August 14, December 22, 1908 (A. H. Jennings); Alhajuela, Chagres River, Canal Zone, Panama, March 18, 1909 (A. H. Jennings).

AËDES MEDIOVITTATA (Coquillett) Dyar & Knab.

Stegomyia mediovittata Coquillett, Can. Ent., xxxviii, 60, 1906.
Gymnometopa mediovittata Coquillett, Proc. Ent. Soc. Wash., vii, 183, 1906.
Aëdes mediovittata Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 196, 1906.
Aëdes mediovittata Dyar, Proc. Ent. Soc. Wash., viii, 15, 1906.
Gymnometopa mediovittata Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 25, 1906.
Aëdes mediovittata Dyar & Knab, Proc. Biol. Soc. Wash., xix, 164, 1906.
Gymnometopa mediovittata Theobald, Mon. Culic., iv, 210, 1907.
Aëdes uncatus Grabham, Can. Ent., xxxix, 25, 1907.
Aëdes mediovittata Pazos, Anal. Acad. Cien. méd., fis. y nat. Habana, xlv, 418, 1908.
Aëdes mediovittata Pazos, San. y Ben., ii, 48, 323, 1909.
Gymnometopa mediovittata Theobald, Mon. Culic., v, 219, 1910.
Aëdes uncatus Theobald, Mon. Culic., v, 596, 1910.

ORIGINAL DESCRIPTION OF STEGOMYIA MEDIOVITTATA:

Proboscis black, unmarked, palpi black scaled, in the male the bases of the joints white scaled, in the female only the apices of the joints are white; inner side of first antennal joint white scaled, scales of occiput black, a median line of white ones, those on the sides yellow and white. Thorax brown scaled, a median line of white ones, which is divided into two branches on the posterior fifth of the mesonotum; on either side of this line is a stripe of dark brown scales, followed by a line of light yellow scales, which become whitish on the posterior portion of the mesonotum; a broadly interrupted line of white scales midway between this line and the insertion of the wing, and a similar line just above this insertion, a spot of white scales on the humerus, and several similar spots on the pleura; scutellum with a spot of white scales on each of its three lobes. Abdomen black scaled, with a bluish reflection, a spot of white ones near base of sides of the last four segments, and a few white scales at apex of the last segment. Legs black scaled, a line of white ones on anterior and posterior sides of each femur, a spot above middle of anterior side of each tibia, the base of the first two joints of the front and middle tarsi and the base of each joint of the hind ones white scaled; tarsal claws of the female simple, those of the front and middle tarsi of the male with one tooth under one of the claws, none under the other, claws of the hind tarsi simple. Wings hyaline, the scales black. Length about 3 mm.

San Domingo, West Indies. Thirty-four specimens, collected by Mr. August Busck. Type No. 9138, U. S. National Museum.

ORIGINAL DESCRIPTION OF AËDES UNCATUS:

Close to *Stegomyia mediovittata*, Coq., from Santo Domingo (CAN. ENT., Feb., 1906, p. 60), but the subdorsal thoracic lines are made up of light yellow scales throughout their whole length. Full-grown larva with six or seven separate comb scales, each scale with a simple stout curved spine arising from a pear-shaped base. The larvæ of this form, collected from hollow trees, have been sent to me from several localities near Kingston (Waverley Estate; Constant Spring: woods above Rockfort). In all the specimens examined the comb scales had simple spines unlike the Santo Domingan form, which has trifid spines (Dyar and Knab, Jour. N. Y. Ent. Soc., XIV, Pl. V, fig. 11). I am indebted to Dr. H. G. Dyar for comparing the larvæ and adults of these two species. Bred specimens vary greatly in size, the largest attaining about 6 mm. in length. The females bite blood without hesitation.

DESCRIPTION OF FEMALE, MALE, LARVA, AND PUPA OF AËDES MEDIOVITTATA:

Female.—Proboscis rather long, slender, cylindrical, uniform; labellæ conically tapered; vestiture black with a few pure white contrasting scales

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irregularly distributed; setæ minute, curved black, those on labellæ more prominently outstanding. Palpi short, about one-fifth as long as the proboscis, slender; vestiture black, a small white spot in the middle within, tip broadly white. Antennæ filiform, the joints subequal, rugose, black, with long pile; second joint thickened towards apex; tori subspherical, with a cup-shaped apical excavation, yellowish, shading to black within, the dark part densely covered with silvery-white scales; hairs of whorls sparse, long, black, the distal ones much shorter. Clypeus elongate, rounded triangular with a slight impression on outer half, dark brown, silvery pruinose. Eyes separated on frons, black. Occiput dark brown, clothed with rather narrow curved scales in a narrow line on the vertex, the others broad; color of vestiture yellow-brown shading into black, a narrow silvery-white stripe in the middle of vertex and extending forward between eyes to base of antennæ, margins of eyes and lower part of sides silvery-white; a row of erect forked black and golden scales well back on the nape; bristles along margins of eyes black.

Prothoracic lobes elliptical, remote dorsally, brown, similarly colored to sides of mesonotum with an oblique band of silvery-white scales and with black bristles. Mesonotum yellowish brown; vestiture of small narrow curved scales, dense and deep brown in a median longitudinal stripe on the dorsum, causing the color to appear dark bronzy-brown, sparse on the sides, the dark median stripe divided by a narrow silvery line from anterior edge to antescutellar space and bordered on each side by a narrow golden, occasionally partly or wholly silvery, subdorsal line running the whole length but interrupted at the middle; a small silvery-white patch centrally on lateral area towards outer margin; sides of antescutellar space and a short line above wing-insertion narrowly silvered; a silvery patch before wing-insertion; setæ rather coarse, black. Scutellum trilobate, pale brown, mid lobe clothed with narrow, curved black scales, each lobe tipped with broad silvery-white scales and bearing a group of black bristles. Postnotum elliptical, prominent, yellow-brown, nude. Pleuræ and coxæ yellowish, clothed with small remote patches of silvery white scales and with rows of pale bristles.

Abdomen subcylindrical, tapered posteriorly, fifth, sixth, and seventh segments apically expanded beneath; dorsal vestiture black, very narrowly pale-scaled at bases of third, fourth and fifth segments, a series of large, lateral, basal segmental silvery patches; venter with black and luteous scales intermixed, the dark scales predominating on apical portions of segments; bristles dark. Cerci black. In some specimens the silvery lateral spots are ventrally produced on the fifth, sixth and seventh segments to form subapical bands.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of the second posterior cell somewhat shorter than its cell; basal cross-vein more than its own length from anterior cross-vein; scales of veins blackish-brown, costa with blue-black reflection; outstanding scales ligulate with rounded tips, those on forks of second vein dense and much broader. Halteres yellowish, with blackish knobs.

Legs slender, rather long; vestiture black with a bluish reflection, marked with silver white; on the front and mid femora the white scales predominate narrowly beneath, form a line along the under side to near apex and are irregularly scattered over the sides; hind femora with a narrow line of white scales to near apex on both outer and inner sides; knees broadly white-scaled; tibiæ with a small white patch on under side about one-third from base; a small white spot at bases of first and second joints of fore and mid tarsi; hind tarsi with a broad white ring at base of each joint which in last two covers three-fourths of joint. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

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Male.—Proboscis straight, long and slender, bronzy-black scaled. Palpi about as long as the proboscis, slender, the terminal joints long, not enlarged and with only a few scattered black bristles; vestiture black, a broad white ring at base, a narrower one just beyond middle of long joint, a narrow white ring at bases of the last two joints. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, whitish, narrowly ringed with deep black at insertions of hair-whorls; hairs of whorls long, dense, brown. Coloration similar to the female. Abdomen elongate, depressed, sixth and seventh segments laterally broadened; segments with narrow, dirty-white basal bands above, silvery lateral spots visible in dorsal view on fifth, sixth and seventh segments; last segment with a large median patch of silver scales; lateral ciliation short, coarse, irregular, brown; claspers with a patch of silver scales at their bases. Wings narrower than in the female, stems of the fork-cells longer, the vestiture less abundant. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Genitalia (plate 30, fig. 206): Side-pieces over twice as long as wide, tip conically tapered, apical lobe absent, basal lobe a small swelling bearing fine setæ with tubercular bases, a long spine at extreme base of side-piece. Clasp-filament short, slightly swollen on apical two-thirds, with a long articulated terminal spine, over half as long as filament. Harpes elliptical, concave, inner margin thickened, revolute, tip bent over, tridentate. Harpagones with a long slender columnar base, curved, pilose, bearing a small seta at middle and an articulated triangularly spatulate terminal filament. Unci contiguous, revolute, forming a basal cone. Basal appendages small, bearing four terminal spines.

Larva, Stage IV (plate 124, fig. 432).—Head rounded, hardly narrowing before eyes, a slight notch at insertion of antennæ, front margin broadly arcuate. Antennæ cylindrical, slender, smooth, a single small hair beyond the middle; a long spine at tip, two short ones, a spine and a digit on a pedicel. Eyes small, rounded. Both pairs of dorsal head-hairs single, the anterior pair approximated and near anterior margin; ante-antennal tuft of two hairs. Mental plate shortly triangular, a stout central tooth and ten on each side, the apical ones rounded and closely set, the basal ones sharp and remote; base of plate roundedly incised, almost toothed. Mandible quadrangular, with sharp spines at base; two filaments before tip; a row of cilia from a collar; outer margin oblique, with a row of filaments near the cilia; dentition of four teeth on a process, the first tooth long; a spine before, a serrate filament and four narrow ones within, a cleft tooth at base; process below broadly trifid, the upper lobe angled, middle one rounded, lower slender, each with a hair-tuft at tip, a row of hairs along the middle; basal angle obsolete; a row of hairs within and another at base. Maxilla elongate, somewhat truncate, divided by a band-shaped suture; inner half with a chitinized basal area from which arise four long spines and a row of shorter ones, two lines of cilia, the marginal one with spinules intermixed, a tuft of hairs at tip; outer half with a long spine next the hair-tuft, the two articulated digits situated subapically, a few hairs within; palpus nearly as long as the maxilla, slender, with four apical digits, of which one is long. Thorax rounded, wider than long; hairs abundant, rather long, subdorsal prothoracic tufts multiple; small tufts on disk of thorax stellate. Abdomen moderate, anterior segments shorter; lateral hairs rather long, multiple on first segment, double on second to sixth; secondary hairs in coarse stellate tufts; tracheal tubes rather narrow, band-shaped. Air-tube stout, slightly tapered on outer half, two and a half times as long as wide; pecten reaching nearly to middle, of very long teeth closely set and running in a spiral one-third of the way around the tube; single pecten-tooth simple; a single hair beyond pecten. Lateral

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comb of eighth segment of six scales in a curved row; single scale elliptical, with three apical teeth, the central one about as long as body of scale, the others about half as long. Anal segment as long as wide, with a dorsal plate which tapers behind and is fringed by a row of long spines; dorsal tufts of two pairs of brushes; a lateral tuft of five long hairs at posterior angle of plate; ventral brush well developed, with a small triangular plate on either side; anal gills short, tapered, not as long as segment, the lower pair a little shorter than upper.

Pupa (plate 150, fig. 710).—Thoracic mass subpyriform, with a few scattered hairs on dorsum; air-tubes slender, narrowly funnel-shaped, the tips obliquely truncate; abdomen elongate, slender, the segments expanded posteriorly; hairs slight, the lateral tufts of the eighth segment long, but of few hairs; anal paddles with single very long terminal hairs.

The larvæ live in the water in holes in trees and also in artificial receptacles, more especially if made of wood. Mr. John R. Taylor obtained eggs and writes us as follows:

"The eggs are cylindrical in shape, with conical extremities, being slightly larger near one end than the other, although both ends possess about the same degree of bluntness. They must darken very quickly, as we have not been able to observe white eggs. The egg measures 0.72 mm. long and 0.17 mm. broad. The cells appear to be regularly hexagonal in form. The eggs are deposited, each egg on its side, either singly, in parallel rows of four or more eggs, or in chain form. The eggs were deposited in a tin in which grass had been placed, on the grass near to the water line."

In nature the eggs are doubtless deposited near the water, upon the side of the cavity or receptacle, as is the habit of all the tree-hole inhabiting *Aëdes* with which we are acquainted. There are probably a number of broods during the year, but, owing to the more permanent character of the water inhabited by the larvæ, these are not differentiated.

Greater Antilles.

San Francisco Mountains, Santo Domingo, September, 1905 (A. Busck); Mayaguez, Porto Rico (W. V. Tower); Kingston, Jamaica (M. Grabham); Santiago, Cuba, August (through C. S. Ludlow); San Antonio de los Baños, Cuba (J. H. Pazos).

Dr. Grabham has described specimens from Jamaica as a distinct species, under the name *uncatus*, in which the comb-scales of the eighth abdominal segment of the larva end in a single long thorn instead of being trifid. We think, after studying the forms from several islands, that this distinction, although usually valid, is not specific in this case. The species varies slightly also as adult, but there is no coördination between the variation of adult and larva, nor any breaking up into separate species or races in the different islands.

AËDES CALOPUS (Meigen) Dyar & Knab.*

Culex fasciatus Fabricius (not Müller; not Meigen), Syst. Antliat., 36, 1805.
Culex calopus Meigen, Syst. beschr. bek. Eur. Zweifl. Ins., i, 3, 1818.
Culex fasciatus Wiedemann (not Müller), Dipt. Exot., 36, 39, 1821.
Culex mosquito Robineau-Desvoidy, Mém. Soc. d'hist. nat. Paris, iii, 407, 1827.
Culex calopus Robineau-Desvoidy, Mém. Soc. d'hist. nat. Paris, iii, 406, 1827.
Culex fasciatus Robineau-Desvoidy (not Müller), Mém. Soc. d'hist. nat. Paris, iii, 408, 1827.
Culex frater Robineau-Desvoidy, Mém. Soc. d'hist. nat. Paris, iii, 408, 1827.
Culex fasciatus Wiedemann (not Müller), Aussereurop. Zweifl. Ins., i, 8, 1828.
Culex tæniatus Wiedemann, Ausser. Zweifl. Ins., i, 10, 1828.
Culex mosquito Guérin et Percheron, Gen. des Ins., 2 Livr., No. 9, pl. ii, f. 1, 1835.
Culex kounoupi Brullé, Expd. scient. de Morée, Zool., iii, 289, 1836.

* The earliest name for this species is *Culex argenteus* (Poiret, Journ. de Physique, xxx, 245, 1787) and accordingly it will now have to be called *Aëdes argenteus*. This discovery was made too late to carry out the necessary changes throughout this work.

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Culex calopus Macquart in Webb et Berthelot, Hist. Nat. Iles Canaries, ii, Ins., 99, 1839.
Culex annulitarsis Macquart, Dipt. Exot., Suppl. 1 (Mém. Soc. roy. Sci. Agr. Arts Lille, 1844), 8, 1846.
Culex fasciatus Walker (not Müller), List Dipt. Brit. Mus., i, 3, 1848.
Culex viridifrons Walker, List Dipt. Brit. Mus., i, 3, 1848.
Culex excitans Walker, List Dipt. Brit. Mus., i, 4, 1848.
Culex formosus Walker, List Dipt. Brit. Mus., i, 4, 1848.
Culex inexorabilis Walker, List Dipt. Brit. Mus., i, 4, 1848.
Culex tæniatus Walker, List Dipt. Brit. Mus. i, 5, 1848.
Culex calopus Macquart, Dipt. Exot., 4 Suppl. (Mém. Soc. roy. Sci. Agr. Arts, Lille), 9, (313), 1850.
Culex exagitans Walker, Ins. Saund., Dipt., 430, 1856.
Culex impatibilis Walker, Proc. Linn. Soc., Zool., iv, 91, 1860.
Culex zonatipes Walker, Proc. Linn. Soc. Zool., v, 229, 1861.
Culex mosquito Finlay, Anal. Acad. Cien. Habana, xviii, 153, 1881.
Culex fasciatus von Röder (not Müller), Ent. Zeit. Stettin, xlvi, 338, 1885.
Culex calopus von Röder, Berl. Ent. Zeits, xxxi, 73, 1887.
Culex bancrofti Skuse, Proc. Linn. Soc. N. S. W. (2), iii, 1740, 1889.
Culex elegans Ficalbi, Bull. Soc. ent. Ital., xxi, 95, 1889.
Culex mosquito Lynch Arribálzaga, Rev. Mus. de La Plata, ii, 160, 1891.
Culex elegans Lioy, Ditteri Italiani, 79, 1895.
Culex mosquito Williston, Trans. ent. soc. Lond., 272, 1896.
Culex calopus Ficalbi, Bull. Soc. ent. Ital., xxviii, 251, 1896.
Culex elegans Ficalbi, Bull. Soc. ent. Ital., xxviii, 251, 1896.
Culex kounoupi Ficalbi, Bull. Soc. ent. Ital., xxviii, 256, 1896.
Culex rossii Giles, Journ. Trop. Med., ii, 64, 1899.
Culex fasciatus Coquillett (not Müller), U. S. Dept. Agr., Div. Ent., Circular 40, 2d ser., 5, 6, 1900.
Culex fasciatus Howard (not Müller), U. S. Dept. Agr., Div. Ent., Bull. 25, n. s., 19, 20, 1900.
Culex tæniatus Giles, Handb. Gnats or Mosq., 216, 1900.
Culex bancroftii Giles, Handb. Gnats or Mosq., 220, 1900.
Culex mosquito Giles, Handb. Gnats or Mosq., 224, 1900.
Culex inexorabilis Giles, Handb. Gnats or Mosq., 264, 1900.
Culex exagitans Giles, Handb. Gnats or Mosq., 230, 1900.
Culex kounoupi Giles, Handb. Gnats or Mosq., 231, 1900.
Culex viridifrons Giles, Handb. Gnats or Mosq., 232, 1900.
Culex fasciatus Giles (not Müller), Handb. Gnats or Mosq., 235, 1900.
Culex calopus Giles, Handb. Gnats or Mosq., 237, 1900.
Culex excitans Giles, Handb. Gnats or Mosq., 244, 1900.
Culex impatibilis Giles, Handb. Gnats or Mosq., 255, 1900.
Culex formosus Giles, Handb. Gnats or Mosq., 283, 1900.
Culex annulitarsis Giles, Handb. Gnats or Mosq., 286, 1900.
Culex zonatipes Giles, Handb. Gnats or Mosq., 287, 1900.
Culex fasciatus Reed, Carroll, Agramonte & Lazear (not Müller), Phil. Med. Journ., vi, 792, 1900.
Stegomyia fasciata Reed & Carroll, Med. Record, lx, 641, 1901.
Culex tæniatus Grimshaw, Fauna Hawaiiensis, iii, 6, 1901.
Culex tæniatus Giles, Journ. Trop. Med., iv, 159, 1901.
Stegomyia fasciata Theobald, Journ. Trop. Med., iv, 159, note, 1901.
Stegomyia fasciata Howard, Mosquitoes, 123, 127, 135, 155, 236, 1901.
Stegomyia fasciata Theobald, Mon. Culic., i, 289, 1901.
Stegomyia fasciata var. *mosquito* Theobald, Mon. Culic., i, 295, 1901.
Stegomyia fasciata var. *luciensis* Theobald, Mon. Culic., i, 297, 1901.
Stegomyia fasciata var. *queenslandensis* Theobald, Mon. Culic., i, 297, 1901.
Stegomyia nigeria Theobald, Mon. Culic., i, 303, 1901.
Culex tæniatus Ribas, Brazil-Medico, xv, 412, 1901.
Culex elegans Grassi, Studi di uno zool. sulla malaria, 2 ed., 132, 1901.
Stegomyia fasciata Garman, Bull. 96, Ky. Agr. Exp. Stat., 211, 1901.
Culex fasciatus Cropper (not Müller), Journ. of Hygiene, Cambridge, ii, 51, 1902.
Stegomyia fasciata Durham, Liverpool Sch. Trop. Med., Mem. vii, 15, 55, 1902.
Stegomyia fasciata Neveu-Lemaire, Archiv Parasit., vi, 16, 1902.
Stegomyia fasciata Blanchard, C. R. Soc. Biol. Paris, liv, 644, 1902.
Stegomyia fasciata Dyé, Archiv de Parasit., vi, 365, 367, 1902.
Stegomyia fasciata Giles, Handb. Gnats or Mosq., 2 ed., 372, 1902.
Stegomyia fasciata Theobald, Proc. Roy. Soc. London, lxix, 389, 1902.

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Stegomyia nigeria Giles, Handb. Gnats or Mosq., 2 ed., 375, 1902.
Stegomyia fasciata Goeldi, Os Mosq. no Pará, 1902.
Stegomyia fasciata Parker, Beyer & Pothier, Bull. 13, Yellow Fever Inst., U. S. Publ. Health and Marine-Hosp. Serv., 21, 1903.
Stegomyia fasciata Taylor, Revista de Med. Trop., iv, 113, 1903.
Stegomyia fasciata Theobald, Mon. Culic., iii, 141, 1903.
Stegomyia fasciata Dyar, Journ. N. Y. Ent. Soc., xi, 23, 1903.
Stegomyia fasciata Dyar, Proc. Ent. Soc. Wash., v, 146, pl. ii, f. 12, 1903.
Stegomyia fasciata Verrill, The Bermuda Islands, 335, 1903.
Stegomyia fasciata Marlatt, Proc. Ent. Soc. Wash., v, 117, 1903.
Stegomyia fasciata Carter, Medical Record (N. Y.), lxiv, 794, 1903.
Stegomyia fasciata Carter, Boston Med. and Surg. Journ., cl, 20, 1903.
Stegomyia fasciata Marchoux, Salimbeni & Simond, Brazil-Medico, xvii, 473, 1903.
Stegomyia fasciata Marchoux, Salimbeni & Simond, Ann. Inst. Pasteur, xvii, 680, 1903.
Stegomyia fasciata Guiteras, Revista de Med. trop., Havana, iv, 60, 1903.
Stegomyia fasciata Theobald, Journ. Trop. Med., vi, 237, 1903.
Culex calopus Becker, Mitt. a. d. Zool. Mus. Berlin, ii, 67, 1903.
Stegomyia fasciata Laveran, C. R. Soc. Biol. Paris, lv, 1157, 1903.
Stegomyia fasciata Howard, Publ. Health Repts., xviii, no. 46, 1903.
Stegomyia fasciata Pazos, Bull. Soc. Ent. France, 1904, 135, 1904.
Stegomyia fasciata Carter, Med. Record, lxv, 761, 1904.
Stegomyia fasciata Balfour, First Rept. Wellcome Research Lab. Khartoum, 16, 1904.
Stegomyia fasciata Theobald, First Rept. Wellcome Res. Lab. Khartoum, 71, 1904.
Stegomyia fasciata Goeldi, Os Mosq. no Pará, Bol. Mus. Goeldi, Pará, iv, 129-197, 1904.
Stegomyia fasciata Bourroul, Mosq. do Brasil, 40, 1904.
Stegomyia fasciata Van Dine, Bull. 6, Hawaii Agr. Exp. Station, 14, 22, 1904.
Stegomyia fasciata Van Dine, U. S. Dept. Agr., Ann. Rept. Office Exp. Stations, 1904, 377, 1905.
Stegomyia calopus Blanchard, Les Moustiques, 249, 1905.
Stegomyia nigeria Blanchard, Les Moustiques, 259, 1905.
Stegomyia fasciata Coffin, in Shattuck, The Bahama Ids., 280, 1905.
Stegomyia fasciata Goeldi, Os Mosq. no Pará, 1905.
Stegomyia fasciata Dyar, Journ. N. Y. Ent. Soc., xiii, 54, 1905.
Stegomyia fasciata Theobald & Grabham, Mosq. or Culic. of Jamaica, 19, 1905.
Stegomyia fasciata Felt, Bull. 97, N. Y. State Mus., 489, 1905.
Stegomyia fasciata Howard, Public Health Repts., xviii, no. 46 (revised ed.), 1905.
Stegomyia fasciata Goeldi, C. R. vi Congr. Internatl. Zool., Berne, 193, 1905.
Stegomyia fasciata Herrick, Ent. News, xvi, 282, 1905.
Aëdes calopus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 190, 196, 1906.
Stegomyia fasciata Banks, Phil. Journ. Sci., i, 984, 1906.
Stegomyia fasciata persistans Banks, Phil. Journ. Sci., i, 984, 996, 1906.
Stegomyia calopus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 17, 1906.
Stegomyia calopus Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 5, 1906.
Stegomyia fasciata Theobald, Science Progress, i, 70, 1906.
Stegomyia White, Science, n. s., xxiii, 371, 1906.
Stegomyia calopus Goldberger, Bull. 16, Yellow Fever Inst., U. S. Publ. Health and Marine-Hosp. Serv., 10, 1907.
Stegomyia luciensis Aiken, Brit. Guiana Med. Annual, 1906, 71, 1907.
Stegomyia calopus Autran, Anal. Dep. Nac. Hig., xiv, 17, 1907.
Stegomyia fasciata Theobald, Mon. Culic., iv, 176, 1907.
Stegomyia nigeria Theobald, Mon. Culic., iv, 171, 1907.
Stegomyia calopus Dyar, Proc. U. S. Nat. Mus., xxxii, 128, 1907.
Stegomyia calopus Knab, Journ. N. Y. Ent. Soc., xv, 13, 1907.
Stegomyia calopus Howard, Osler's Modern Medicine, i, 386, 1907.
Stegomyia fasciata Grünberg, Die Blutsaugenden Dipteren, 92, 1907.
Stegomyia nigeria Grünberg, Die Blutsaug. Dipt., 95, 1907.
Culex (*Stegomyia*) *calopus* Viereck, 1st Ann. Rept. Comm. Health Pa., 469, 1908.
Stegomyia calopus Peryassú, Os Culicid. do Brazil, 44, 165, 1908.
Stegomyia calopus van Loghem & van Loghem-Pouw., Geneesk. Tijds. Nederl. Indië, xlviii, 577, 1908.
Culex anguste-alatus Becker, Mitt. a. d. Zool. Mus. in Berlin, iv, 79, 1908.
Culex albopalposus Becker, Mitt. a. d. Zool. Mus. in Berlin, iv, 80, 1908.
Stegomyia fasciata Becker, Mitt. a. d. Zool. Mus. Berlin, iv, 81, 1908.
Stegomyia calopus Busck, Smiths. Misc. Collns., quart. iss., lii, 65, 1908.
Stegomyia calopus Pazos, Sanid. y Benef., ii, 48, 411, 1909.
Aëdes calopus Thibault, Proc. Ent. Soc. Wash., xii, 19, 1910.
Aëdes calopus Dyar & Knab, Proc. Ent. Soc. Wash., xii, 81, 1910.

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Stegomyia calopus Newstead & Thomas, Ann. Trop. Med. & Par., iv, 143, 1910.
Stegomyia fasciata Theobald, Mon. Culic., v, 158, 1910.
Culex variegatus Theobald (not Doleschall, not Schrank, not E. Blanchard), Mon. Culic., v, 159, 1910.
Stegomyia fasciata persistans Theobald, Mon. Culic., v, 159, 1910.
Stegomyia calopus Brimley, Science, N. S., xxxiii, 943, 1911.
Inseules fasciatus Herrera, Anal. Inst. Med. Nac. (Mexico), xi, 235, 1911.
Stegomyia fasciata Seidelin, Yellow Fever Bur. Bull., i, 365, 1912.
Stegomyia fasciata Austen, Yellow Fever Bur. Bull., ii, 3, 1912.
Stegomyia fasciata Edwards, Bull. Ent. Res., iii, 9, 1912.
Stegomyia calopus Jennings, Journ. Econ. Ent., v, 132, 1912.
Aëdes calopus Fullaway, Ann. Rept. Hawaii Agr. Exp. Sta., 1912, 19, 1913.

ORIGINAL DESCRIPTION OF CULEX FASCIATUS:

fasciatus. 13. C. ater haustello tarsisque anticis albo fasciatis.
Habitat in Americae Insulis. Mus. Dom. Lund.
Magnitude C. pipientis. Caput nigrum, haustello porrecto fasciis tribus niveis. Thorax niger, linea dorsali alba. Abdomen obscurum. Alae albae, immaculatae. Pedes nigri, tarsis anticis fasciis tribus niveis.

ORIGINAL DESCRIPTION OF CULEX CALOPUS:

Braun mit Silberpunkten, Beine silberweiss geringelt. Fuscus argenteo-punctatus; pedibus argenteo-annulatis.

Ueberall fast nelkenbraun, bei dem Weibchen mehr mit Gelb gemischt. Bei dem Männchen erscheint der Rükkenschild in gewisser Richtung mitten auf grau, wo dann das Braune vier Längsflekken bildet, deren vordere näher zusammen stehen, die man auch als zwei abgebrochene Striemen ansehen könnte, deren hintere Hälfte nach aussen gerückt wäre. Hinterleibsringe lichter. Kopf, Brust, Hinterleibsseiten und Bauch schön silberflekkig; Knie und Wurzeln der Fussglieder schneeweiss, kaum silberglänzend. Flügel ungefleckt.—Vaterland: Portugal.—Länge 2 bis 3 Linien. (Wiedemann)

ORIGINAL DESCRIPTION OF CULEX MOSQUITO:

Proboscis nigra: palpi albo-annulati; caput et thorax argenteo-maculata; thorax, dorso vitta semilunari argentea; abdomen, incisuris argenteis.

Long. 2 lineas.

♂ Antennae proboscisque nigrae: palpi nigro alboque annulati. Caput nigrum albo-argenteo-punctatum aut maculatum. Thorax albo-argenteo punctatus aut maculatus, dorso vitta semilunari argenteo ad latera. Abdomen nigrum, incisurisque supra argenteis. Femora basi pallida; pedes nigri; tarsorum anteriorum articulis annulis argenteis latioribus. Alae pellucidè-limpidae, nervis vix pilosulis, margine interno villoso-fimbriato.

Habitat in ins. Cuba.—Valdè molestus per pluviarum menses. Indigenae vocant *Mosquito*, sicut mihi retulit dominus Poey.

ORIGINAL DESCRIPTION OF CULEX FRATER:

Culex fasciatus. Wied., *Dipt., exot. p.* 39.

Long. 2 lineas.

Fuscus: palpis tarsisque niveo-fasciatis, proboscide fusca.

"♂ Caput fuscum; tubercula, quibus insident antennae, niveo micantia. (Antennae desunt.) Proboscis ipsa omnino fusca: palporum articuli vero ima basi niveipleurae fuscae aliquot maculis niveis. Abdomen dilutius fuscum. Pedes fusci certo situ flavido-sericantes; basis ima articulorum tarsorum anteriorum nivea.—Pedes postici desunt." Wied. *Dipt. exot.*, pag., 39.

Habitat in insulis Americae.

ORIGINAL DESCRIPTION OF CULEX TÆNIATUS:

Fuscus; thorace trivittato; palpis tarsisque anterioribus niveo bi-, posticis quinque fasciatis. Braun, mit dreistriemigem Rückenschilde; Taster und vordere Fusswurzeln mit zwei, hinterste Fusswurzeln mit fünf schneeweissen Binden.—1½ bis 1¾ Linien. ♂♀—Savannah.

Fühler bräunlich, die Einfügungspunkte an der Stirne schneeweiss. Taster des Männchens mit vier schneeweissen Binden, des Weibchens nur an Wurzel und Spitze weiss; Stirne schneeweiss. Rüssel braun ohne Binden. Der abgeriebene Rückenschild des Männchens braun; der unabgeriebene des Weibchens bräunlich, mit drei braunen Striemen, deren mittelste linienförmig und minder deutlich ist; Naht an beiden Seiten schneeweiss; Schildchen schneeweiss schillernd; Brustseiten bräunlich mit schneeweissen Punkten. Der abgeriebene Hinterleib des Männchens braun, mit gelbweisslichen Einschnitten; hin und wieder sieht man ein schnee-

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weisses Schüppchen; am Weibchen hat der braune Hinterleib deutlicher gelblichweisse Einschnitte, und an jeder Seite jedes Abschnittes einen fast dreiseitigen schneeweissen Flecken. Flügel wasserklar mit braunen Schüppchen. Beine schwärzlichbraun, Schenkelwurzeln breit gelblich, Knie ein wenig schneeweiss; an den vordern Fusswurzeln ist die Basis des ersten und zweiten, an dem hintersten aber die Basis aller Glieder breit und das fünfte Glied überall schneeweiss. Am Kopfe und Rumpfe fallen die schneeweissen Theile in's Silberne.*—In meiner Sammlung.

* Sollte diese Art nicht mit *Cul. fasciatus* eins sein? (Meigen).

ORIGINAL DESCRIPTION OF CULEX KOUNOUPI:

Niger, maculis argenteo-villosis; abdominis posteriori parte scutelloque pallidis; thorace refescente; pedibus nigricantibus; femoribus pene omnino pallide flavis; tarsis argenteo-annulatis.—Long. 5 millim.

DESCR. Tête noire, ornée entre les yeux, en arrière de ceux-ci, à la base des antennes et à l'extrémité des palpes, de lignes et de taches de poils d'un blanc argenté. Corselet d'un roux foncé, marqué sur les côtés de quelques petites taches d'un blanc d'argent: de pareilles taches décorent aussi le prothorax, le dessus du mésothorax et l'écusson; ce dernier et les côtés du métathorax sont d'un roux pâle. Ailes très-joliment irisées, sans taches particulières, garnies de poils bruns le long des nervures: leur bord inférieur ou interne muni d'une frange de poils de même couleur. Balanciers d'un roux pâle. Pattes d'un brun foncé; cuisses d'un jaune pâle en dessus jusque près de leur extrémité: cette dernière partie revêtue de petits poils argentés; tarses entourés à la base de leurs articles d'un large anneau de semblables poils. Abdomen noir en dessous et à la base; le bord inférieur des segmens et la moitié postérieure de l'abdomen d'un roux pâle: chaque segment est marqué de chaque côté d'une tache de poils argentés, et les deux premiers en portent même à leur partie dorsale.

Hab. Cette espèce est aussi incommode que jolie; depuis le milieu de Mai jusqu'à la fin de saison chaude elle est répandue dans l'air par troupes considérables, surtout dans le voisinage des eaux.

Obs. Nous avons conservé à cet insecte le nom qu'il porte dans le pays; les Grecs l'appellent en effet Κουνούπι (cousin).

ORIGINAL DESCRIPTION OF CULEX ANNULITARSIS:

Fuscanus. Tibiis albo annulatis; metatarsis posticis albidis, fusco annulatis.

Long. 2 l. ♀. Pieds bruns. Cuisses à base blanchâtre; jambes postérieures à large anneau blanchâtre avant l'extrémité; premier article des tarses postérieurs blanchâtre, à petit anneau brunâtre.

De l'île de France. Ma collection.

ORIGINAL DESCRIPTION OF CULEX VIRIDIFRONS:

Fem. *Fuscus, argenteo micans, capite viridi, abdomine fulvo apice fusco, pedibus fulvis, genubus tarsorumque annulis albis, alis limpidis.*

Head and chest brown, clothed with yellow hairs, and adorned with silvery spangles: disk of the head green: chest with three gray stripes: abdomen pale tawny, brown towards the tip, and having a brown line along each side, where it is adorned with large white spots: mouth tawny: feelers and palpi brown: legs tawny; tips of thighs brown; knees white; feet with alternate rings of white, tawny and brown: wings colourless; veins brown, much fringed; poisers yellow, with brown knobs. Length of the body 2 lines; of the wings 3½ lines.

a. ———? I resented by Captain Lord Byron.

ORIGINAL DESCRIPTION OF CULEX EXCITANS:

Fem. *Flavo-fuscus, argenteo micans, thorace albo hirto, abdomine albo fasciato, pedibus nigro-fuscis, femoribus flavis, genubus tarsorumque articulis 1° et 2° basi albis, alis limpidis.*

Body pale yellowish brown, adorned with silvery lustre on each side: feelers and mouth dark brown; tip of the latter black: chest clothed with white hairs: abdomen with a band of white hairs on the fore-border of each segment: legs dark brown; base of the first and of the second joints of the feet white; knees also white; thighs yellow, with brown tips: wings colourless; veins brown; poisers yellow. Length of the body 2 lines; of the wings 4 lines.

a. Georgia. From Mr. Abbot's collection.

ORIGINAL DESCRIPTION OF CULEX FORMOSUS:

Fem. Deep rich brown: head much adorned with silvery spangles, as is also the chest, where they form four stripes, of which the inner pair are straight and narrow, the outer pair broad and curved: abdomen also adorned with silvery spangles.

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mouth black: feelers brown: eyes dark red: legs brown, beset here and there with silvery marks; knees and rings of feet silvery: wings somewhat gray; veins brown, very thickly feathered; poisers yellow. Length of the body 2 lines; of the wings 4 lines.

a. Sierra Leone. Presented by the Rev. D. F. Morgan.

ORIGINAL DESCRIPTION OF CULEX INEXORABILIS:

Fem. *Nigro-fuscus, argenteo micans, antennis pedibusque nigris, tarsorum articulis albo cinctis, alis subfuscis.*

Body dark brown, adorned with silvery luster, which especially prevails beneath and on the sides of the body: mouth and feelers black; abdomen wanting: legs black; each joint of the feet with a white band at the base: wings slightly brown; veins dark brown; poisers yellow, with brown knobs. Length of the body 1½ line; of the wings 3 lines.

a. West Africa. From Mr. Fraser's collection.

ORIGINAL DESCRIPTION OF CULEX EXAGITANS:

FOEM. *Fusca; albo varia; palpi nigri, apice albi; thorax albido bivittatus; abdomen testaceo varium, fasciis albidis maculisque lateralibus argenteis; pedes gracillimi, femoribus testaceis apice fuscis, genubus et tarsorum fasciis argenteis; alae subcinereae.*

Brown, with white spangles. Proboscis slender, curved, partly testaceous. Palpi black, with silvery white tips. Thorax with two slender whitish stripes. Abdomen mostly testaceous in the disk, with a whitish band at the base of each segment, and with a row of silvery white dots along each side. Legs very slender; femora testaceous, with brown tips; knees silvery white; tarsi with silvery bands. Wings grayish; veins brown, fringed with brown hairs. Halteres testaceous? Length of the body 2½ lines; of the wings 4 lines.

Parà.

This species much resembles *C. toxorhynchus*, but the latter has not the whitish stripes on the thorax, nor the white dots on the abdomen.

ORIGINAL DESCRIPTION OF CULEX IMPATIBILIS:

Mas. Subcupreo-niger, capite albo punctato, pectore albo guttato, abdomine fasciis interruptis albis, genubus albis, femoribus posticis albis apice nigris, tarsis intermediis basi albis, tarsis posticis albo bifasciatis, alis cinereis.

Male. Black, with a very slight cupreous tinge. Head with shining white points, sheaths of the proboscis dark tawny, longer than the thorax. Pectus with shining white dots. Abdomen with interrupted shining white bands, which are most complete beneath. Knees white; hind femora white, with black tips; middle tarsi white at the base; hind tarsi with two white bands. Wings cinereous; veins black, fringed. Length of the body 2 lines; of the wings 3 lines.

[Makassar, Celebes.]

ORIGINAL DESCRIPTION OF CULEX ZONATIPES:

Mas. Ferrugineus, pedibus fuscis, femoribus basi pallidis, genubus tarsorumque fasciis quatuor albis, alis cinereis, venis nigris ciliatis.

Very nearly allied to *C. impatibilis*, but distinct.

Male. Ferruginous; proboscis about half the length of the body; legs brown; femora pale at the base; knees white; tarsi with four broad white bands; wings cinereous; veins black, fringed. Length of the body 2½ lines; of the wings 4 lines.

[Dorey, New Guinea.]

ORIGINAL DESCRIPTION OF CULEX BANCROFTI:

♂.—Length of antennæ.....	0.065 inch.....	1.66	millimètres.
Expanse of wings.....	0.100 × 0.23	.....2.54 × 0.58	
Size of body.....	0.140 × 0.030	.....3.55 × 0.76	

Antennæ very dark brown, the verticils black, about ¾ the length of the palpi; first joint of the scapus black, with silvery-white scales. Head deep brown, almost black (when denuded), covered with violet-black scales, with a very small patch of silvery-white on each side, some white or yellow scales in the middle, and a line of silvery-white bordering the eyes. Proboscis deep violet-black, as long as the palpi. Palpi deep violet-black, the four joints ringed at the base with silvery-white, the first two rings much broader than the last two. Thorax very dark brown (when denuded), covered with brown scales, interspersed with some brown hairs, and traversed by four longitudinal silvery-white lines:—the two median ones extremely fine and rather indistinct, parallel, stopping at an oblong bare space in front of the scutellum, the lateral ones bent at the middle, distinct, particularly the anterior half which is much broader than the rest; pleurae very dark brown, spotted with numer-

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ous small patches of brilliant silvery-white scales; covered above with silvery-white scales; scutellum very dark brown, covered above with silvery-white scales and fringed with long brown hairs; dark brown. Halteres ochre-yellow. Abdomen a little more than twice the length of the thorax, densely clothed with violet-black scales, the second to sixth segments bordered anteriorly with a narrow band of white, those on the last three short and not reaching the lateral borders, each segment with a small patch of brilliant silvery-white scales at the sides; venter covered with yellowish and violet-black scales, the latter predominating; holding-forceps black or very deep brown, densely haired. Coxae brown with silvery-white scales. Femora, tibiae and tarsi covered with violet-black scales; the femora with white scales along the sides nearly to the tip and beneath on the basal half, the extreme apex silvery-white; the first two joints of the fore and intermediate, and all the joints of the hind tarsi, ringed with silvery-white at the base, those of the first two pairs of tarsi very slight. In the hind-legs, the tibia about ½ longer than the metatarsus. Wings about the length of the abdomen, hyaline, the veins covered with violet-brown scales. Auxiliary vein reaching the costa opposite the cross-vein, and much before the tip of the posterior branch of the fork of the fifth longitudinal; middle cross-vein shorter than the posterior cross-vein, situated beyond it a distance a little greater than the length of the latter; first sub-marginal cell considerably longer and almost imperceptibly narrower than the second posterior cell, its base lying almost opposite that of the latter; anterior branch of the fifth longitudinal vein as in the last species.

Hab.—Brisbane, Queensland (Drs. J. and T. L. Bancroft). Several specimens. December.

ORIGINAL DESCRIPTION OF CULEX ELEGANS:

Il maschio è succhiatore di sangue e punge acutamente. Il C. elegans é zanzara prettamente diurna.—Palpi nel ♂ appena più lunghi della proboscide, appuntati; neri, con 4 anelli bianco-argentei: nella ♀ con ultimo articolo bianco-argenteo, gli altri neri, ma il penultimo con macchiolina nivea. Proboscide nera. Torace su fondo bruno-scuro ha elegantissime ornamentazioni argentee. Ali fuliginose; forchette alari con ramuli più lunghi dei respettivi scapi; lo scapo anteriore e il posteriore presso a poco della stessa lunghezza. Anche scure, argentate. Femori bianchicci in corrispondenza della radice e inferiormente, fuor che nella porzione distale; superiormente, eccetto la radice, neri; con piccolo anello niveo alla loro estremità distale, che, senza intervento della tibia, fa apparire nivei tutti i ginocchi. Tibie nere. Tarsi delle due prime paia con articulo 1° e 2° nero, annulato di bianco alla base (solamente), gli altri articoli neri, non annulati, tarsi del terzo paio con 1°, 2°, 3°, 4° articolo neri annulati di bianco alla base (solamente), il 5° articolo del tutto bianco. Addome dorsalmente su tinta fondamentale bruno-nera presenta eleganti ornamentazioni argentee, tra le quali 7 o 8 macchie laterali argentee per parte; ventralmente ha tinta bruno-nera (predominante), giallo paglia e argentea, disposte in ornamentazioni eleganti.

[Followed by a detailed description of male and female occupying four pages, in Italian.]

ORIGINAL DESCRIPTION OF CULEX ROSSII:

Size of Parts in Male and Female Specimens.

MALE.			FEMALE.		
Head	0.6	mm.	Head	0.8	mm.
Thorax	1.3	"	Thorax	1.5	"
Abdomen	2.8	"	Abdomen	2.9	"
Proboscis	2.2	"	Proboscis	2.1	"
Palpus	2.2	"	Palpus	0.45	"
Antenna	1.3	"			
Wing	2.9 + 0.7	"	Wing	4.4 + 0.9	"

Wings unspotted. Tarsi white-ringed at the bases of the first and second joints only on all the legs, which also show minute knee spots. Body dark brown, brindled with white in the male; the abdomen with basal white bands to the first five segments, and a median white line: coloration of the female, lighter and less brilliant, the brown being lighter and the white less pure.

Head black, with a white nuchal collar. Eyes black, with brown reflexes and a margin of white scales. Antennae, with the globular basal joint black, saving a broad ring of white on its anterior face, round the insertion of the second joint; the remaining joints whitish, with black verticils, the roots of which have the effect of minute black bands; the last two joints deep brown, and together forming more than a fourth of the length of the appendage. Proboscis deep brown, a little paler beneath, near the end. Palpi exactly equal in length to the proboscis, black with

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broad basal white bands, those of the first two joints being especially broad and distinct; the basal joint short, the second forming more than half the entire length of the appendage, the last two of equal length. Thorax (when denuded) dark brown. In some specimens, there are traces of white scales, so that, in all probability, there are white markings in unrubbed specimens. There are also white spots on the sides, corresponding to the white marks on the coxae, and also beneath the insertion of the wings. Scutellum dark brown, glabrous, or denuded.

Legs differing comparatively little in length, those of one specimen being 6.1, 6.5, and 7.5 mm. for the fore, middle and hind pairs respectively; brindled with light and dark brown, with the coxae covered with pure white scales externally; the femora paler at the base, especially internally, where they are nearly white, with a minute white knee spot, and an inconspicuous basal white band to the two first tarsal joints on all the legs; the remaining tarsal joints being unbanded. The fore and hind claws are each provided with a well-marked basal tooth, those of the fore leg being, however, much the larger: the claw of the middle leg is untoothed, but is otherwise as large as that of the fore.

Wings hyaline, with dark scales; auxiliary, joining the costal opposite the supernumerary transverse vein, and considerably before the level of the tip of the fifth longitudinal; supernumerary and middle transverse veins at the same level. Subcostal transverse, much nearer the origin of the second longitudinal than to the numeral transverse; posterior, placed more than twice its length behind the middle transverse, and of about equal length, the former joining the anterior branch of the fifth longitudinal a good deal before its middle; anterior branch of the fifth longitudinal originating considerably before the tip of the sixth, and its tip joining the posterior border well beyond the base of the second posterior cell, which latter is considerably shorter than the first submarginal, although much wider. Halteres pale-tinted.

Abdomen black, with a median white line, broadening at the front of each of the first five segments, into a distinct, broad band, and with a barely perceptible white fringe to the hind border. The sixth segment is brindled with white and black scales in the middle, and has a white spot on either side; the seventh is entirely black, and there is a minute terminal white spot on the last. Ventrally, the white forms the ground colour, with sinuous black lateral lines, which meet to form a transverse band on the fourth segment. The last segment is armed with exceptionally large, incurved claspers.

The above applies specially to the male; the female is larger in nearly all dimensions, except the length of abdomen, which, however, is much stouter, the thorax and wings greatly exceeding those of the male in size. The antennae are black throughout, and appear proportionally longer than those of the male. The palpi are also black and without bands; the two proximal joints shorter than the distal, being together barely equal to one of the latter, which are subequal. The general coloration of the female is altogether less brilliant, the dark parts being much paler, and the whites impure. The dorsum of the abdomen is dark greyish brown, with an ill-marked light basal band to each segment, and ventrally, the brown lateral lines are joined by cross bands on nearly every segment, the white parts, external to the sinuous dark line, giving the appearance of a series of lateral light spots.

Habitat.—India (Calcutta). Major Ross, I. M. S.

Note.—This species closely resembles, but is not I think, identical with C. taeniatus, described by Wiedemann, from Savannah. The dorsum of the thorax is so denuded of its scales in all my available specimens, that the characteristic adornment of the female of Wiedemann's species, which is specifically stated to be noticeable in only unrubbed specimens, would not be in any case discernible. These markings were, however, darker than the grounding, while there are sufficient remains to show that the adornment of the present species was white on a dark ground, though not to enable one to judge its exact character. On the other hand, I can make out no trace of the snowy scutellum of C. taeniatus, and though the abdomen of several of my specimens is in very fair condition, it does not correspond to the description of that species.

The palpi of the male correspond, but those of the female are black, or at most, show only a trace of white at the base of the terminal joint, instead of being white at the base and tip. For these reasons, without laying undue stress on the American habitat of C. taeniatus, it appears more probable that they are distinct species.

ORIGINAL DESCRIPTION OF STEGOMYIA FASCIATA VAR. LUCIENSIS:

These specimens resemble *S. fasciata*, and are probably merely a variety of that species.

They differ, however, in having a very clearly defined black band at the tip of the last tarsal joint, whereas in *S. fasciata* the last tarsal joint is always pure white.

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Habitat.—Demerara, Georgetown, (Queich) (16. 6. 1899), a ♂ and ♀; also from St. Lucia.

Time of appearance.—Demerara, March and May (Queich).

Observations.—In all respects the specimens received from Demerara and St. Lucia agree with *S. fasciata*, with the exception that the last tarsal joint of the hind-legs is apically banded black. A similar variation is seen in *Anopheles argyrotarsis*.

ORIGINAL DESCRIPTION OF STEGOMYIA FASCIATA, VARIETY QUEENSLANDENSIS:

Specimens of a peculiarly marked *S. fasciata* were sent by Dr. Bancroft, under the name of *C. Bancroftii* Skuse.

They form a very distinct variety in regard to coloration, but as I can detect no structural differences from this world-wide gnat, I think they should be considered merely varieties of that species, which occurs in the same neighbourhood.

♀. Differs from the type first in that the mid lobe of the scutellum is covered with a patch of deep purple scales, and secondly, in regard to the abdominal ornamentation, which has both basal and apical yellowish-white scales, and also an irregular broad line of the same down the dorsum; in one specimen the entire abdomen is covered with creamy scales.

Length.—4.5 mm.

Habitat.—Bupengary, South Queensland.

Time of capture.—November.

ORIGINAL DESCRIPTION OF STEGOMYIA NIGRIA:

Thorax deep brown, with black scales, two short median pale lines in front of the mesonotum, and a white patch on each side. Abdomen black, with narrow basal white bands and a white spot on each side; venter white scaled. Legs dark brown, tarsi basally white banded, the last in the hind legs all white, and also most of the penultimate joint.

♀. Head black, with a narrow patch of white scales in the middle; palpi black, with white scales at the tip, and a few long bristles; proboscis black, antennae dark brown; basal joint black, with a tuft of white scales, forming two white spots just below the eyes, and on each side of a small tuft of white down projecting between the eyes, which are black and reddish, with a very narrow border of white scales.

Thorax dark brown in some lights, deep black in others, covered with a felt of deep black scales, like *C. vigilax*; a few creamy scales in front of the scutellum; two thin, short, parallel, narrow rows of yellowish scales in front on the mesonotum, and a patch of brilliant white scales on each side, just showing above; scutellum blackish-brown, with a few broad white scales; metanotum deep chestnut-brown; pleurae bright chestnut-brown, with several patches of brilliant white scales.

Abdomen black, with narrow basal bands of white scales. The black scales have a purplish tinge in some lights, a basal white spot on each side, especially on the basal segments. Venter with numerous white scales. Coxae with silvery-white scales; fore legs brown, pale at the base, dark towards the tarsi; mid legs with a white spot (not a band) at the base of the metatarsus and first tarsal joint; hind legs, with the base of the metatarsus and first two tarsi, basally white banded, the third tarsus nearly all white, and the fourth all white; hind tibia much swollen at the apex.

Wings with brown veins and scales, testaceous at the base, scales long; first submarginal cell about twice as long as its stem, longer and narrower than the second posterior cell, whose stem is about equal to its length; posterior cross-vein nearly three times its own length distant from the mid cross-vein; first long vein much curved in the middle; fringe brown.

Length.—4.5 mm.

Habitat.—Bonny, West Africa (J. P. Fagan) (21. 11. 1899).

Time of capture.—October.

Observations.—A single ♀ only of this species received, in good condition, but some of the legs, unfortunately, came off in examination, and are separately preserved.

It can be distinguished by the thick felt of dark scales over the thorax, with the two very narrow and short yellowish vittae in front, and the small brilliant white patch on each side of the mesonotum, and the silvery puncta on the pleurae; the bend in the first long vein is also characteristic.

ORIGINAL DESCRIPTION OF STEGOMYIA FASCIATA PERSISTANS:

Black and dark seal-brown with white and golden-white markings, legs banded white, nearly as in *S. fasciata* Fabr.

♀, head with broad, seal-brown scales, a bare, median occipital sulcus bordered laterally by white scales which unite anteriorly and project between the eyes, which are bordered by narrow, white scales; a series of brown bristles project inward and forward over eyes; sides of head with 2 distinct, white, linear patches

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separated by a brown patch of equal width; eyes, blue-black; clypeus, first antennal segment and apices of palpi with white scales, those on antennae being interrupted externally; a few black scales on second joint of antennae; remaining joints dark-brown, and proboscis dull-black. Prothoracic lobes nearly covered with silver-white scales; mesothorax with narrow, seal-brown scales, shaped and arranged as in *S. fasciata* Fabr. Markings as follows: A broad, silver-white band on each side, curving outward, then inward at middle of thorax and extending back to hinder margin as in *S. fasciata* Fabr. External and parallel to this is a bare or scaleless linear area; between the lyre-shaped figure thus formed, a very short, median golden-white line from anterior margin of mesothorax, then two parallel, sub-median lines extending two-thirds of distance to posterior margin, then a short median extending to brown, bare spot, then 2 parallel sub-median short lines at sides of bare spot, extending to posterior margin; a broken line of white in front of wings, subparallel with hinder curve of lyre-figure, its beginning on pleura; halteres light-brown, pale-knobbed. Second to sixth abdominal segments blue-black, with basal, transverse, silver-white bands and basal, lateral spots on terga; seventh segment minus basal band but with white lateral spots, apical margins of all segments with golden hairs dorsally and ventrally. Ventrum white scaled, fifth and sixth with some black laterally and apically; seventh all black, pale-bordered apically.

Anterior femora pale-scaled basally, a narrow line of which extends to apex externally; black along superior edge; knees with white spot on each side of articulation; mid femora black externally, with longitudinal, white hair-line through middle nearly to apex; base and internal surface whitish; knees white; exterior face of posterior femora white nearly to apex, except superior edge which is black as is apex; knees white; all tibiae black with 2 distinct rows of snow-white spines arranged as on legs of certain *Orthoptera;* all metatarsi and first tarsals brown-black with white basal bands; remaining tarsi on fore and mid legs, uniformly brown-black; posterior second tarsi brown-black, basally white banded; third tarsi, white, apically black-banded; last tarsi, pure white. Ungues equal, unidentate on all except posterior legs.

Wing veins, densely scaled; posterior cross vein a little more than twice its length from the mid cross vein, the interior angle of which with the supernumerary is about 135°. The venation and lepidotaxis are very similar to *S. fasciata* Fabr., and *S. scutellaris sumarensis* Ludl.

♂ similar in all essential respects to ♀. Antennae are conspicuously pale banded; palpi slightly longer than proboscis and with 4 white bands, the apical 2 of which are ventral only; the wings less densely scaled; the posterior cross vein slightly farther removed from mid cross vein and somewhat shorter.

The size in both ♂ and ♀ is extremely variable, specimens of the former measuring from 3.5–5 millimeters and of the latter 4–6 millimeters. Wings length ♂ 1.75–2.25 millimeters; ♀ 2–2.75 millimeters.

MANILA, NEGROS OCCIDENTAL, ILOILO, P. I. (*Banks*, Coll.).

Time of flight: This mosquito has been captured in Manila during every month of the year.

Types of ♂ and ♀ No. 5773 in Entomological Collection, Bureau of Science, Manila, P. I.

This mosquito is the most annoying form found in the Islands and like its congener, *S. fasciata* Fabr., is extremely persistent in its attacks, returning repeatedly however many times it may be repulsed. Upon alighting it walks around to find a suitable place to bite, its favorite points of attack being the back of the neck, the ankles, and the back of the hands when one is holding a book. It will in no case alight upon white articles except such as one may be wearing, such as white socks or white clothes that have been recently removed from the person. Its time of attack is from 1 to 3 p. m. and just as night falls, when the daylight is too dim for reading. It appears also to be a forerunner of a storm, as it usually attacks one with great energy just before signs of a shower appear. This mosquito is very wily, usually attacking one from behind, and when struck at, almost invariably flies behind one's chair to renew the attack as soon as everything appears to be quiet. This is not noticeable with any other species of mosquito so far observed in the Philippines.

ORIGINAL DESCRIPTION OF CULEX ANGUSTE-ALATUS:

Ein Männchen von Teneriffe am 1. Dezember. Flügel ungefleckt, sehr klein und schmal. Rüssel ohne Binden. Beine nur an den Tarsenwurzeln bandiert. Nach der von Theobald für diese Gruppe Band I 383 aufgestellten Bestimmungstabelle ist die einzige vergleichbare Art *C. japonicus*, deren Thorax aber mit fünf goldbraunen Schuppenstreifen geziert ist, während unsere Art vier silberfarbene auf-

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weist; ausserdem sind noch andere Unterschiede in der Zeichnung der Beine vorhanden; eine schön gezeichnete Art.

Männchen. Grundfarbe des Thorax mattschwarz mit kaffeebraunen und silberweissen Schuppen, letztere streifen- und fleckenförmig: zwei schmale silberfarbene Längsstreifen liegen auf der Mitte des Rückens und werden an den Seiten von zwei anderen begleitet; letztere münden aus an der Quernaht und erlangen hier eine grössere Breite, der Quernaht folgend und den vorderen Seitenrand des Thoraxrückens umsäumend; ferner liegen an den Schulterbeulen, vor dem Schildchen, über und unter der Flügelwurzel, auf den Brustseiten und Hüften isolierte weisse Schuppenflecken; die längeren Haare sind schwarzbraun. Schwinger hellbraun. Kopf schwarzgrau, kaffeebraun und weiss beschuppt, mit zwei durch eine feine Längslinie getrennte weisse Längsstreifen auf der Mitte der Stirn und des Hinterkopfes und zwei seitlichen Flecken des letzteren; schwarze längere Haare stehen an den Augenrändern; das erste kugelige Fühlerglied ist schwarz, ringsum weiss eingefasst, die beiden letzten Glieder sind schwarz; die mittleren weiss und schwarz geringelt mit langem schwarzbraunen Federbusch. Rüssel ganz schwarz, Taster schwarz, weiss bandirt, und zwar an der Wurzel der letzten vier Glieder; die Taster sind schlank, sie sind ebenso lang wie der Rüssel und tragen an den Gelenken vereinzelte Härchen. Hinterrücken und Hinterleib matt rostbraun, die letzten Ringe dunkler mit kaffeebraunen Schuppen und silberfarbenen Querbinden und isoliert liegenden Seitenflecken, beide an den Vorderrändern der Ringe. Hypopygium matt schwarz und schwarz behaart. Hüften und Schenkel rostgelb, deren Endhälfte allmählich geschwärzt, zart beborstet mit silberweissen Schuppenflecken an den Knieen aller Beine. Schienen und Tarsen schwarz, letztere sind an beiden Vorderbeinen und zwar an der Wurzel des ersten und zweiten Gliedes schmal weiss geringelt; an den Hinterbeinen sind die drei ersten Tarsenglieder breit weiss geringelt. Klauen alle einfach, klein und gleichlang. Länge der Vorderschiene und der fünf folgenden Tarsenglieder bei 13facher Vergrösserung: 20½, 14½, 5½, 4½, 2, 2½ mm. Börstchen der Schienen zart, aber deutlich und weiss. Flügel 2 10/13 mm. lang und 8/13 mm. breit. Adern zusammengedrängt und mit braunen Schuppen dicht besetzt; die Randschüppchen sind sehr lang; die erste Submarginalzelle ist länger als die zweite Hinterrandzelle; Stiel der ersteren halb so lang wie die Gabel, der letzteren so lang wie der obere längere Gabelzweig; eine fleckenhafte Ansammlung der Schuppen ist nicht wahrzunehmen. Körperlänge 4½ mm.

Original Description of Culex albopalposus:

Ein Weibchen aus S. Cruz auf Teneriffe im März. Flügel ohne Flecken. Rüssel unbandiert; Beine nur an den Tarsenwurzeln bandiert, letztes Tarsenglied an den Hinterbeinen weiss. Klauen all gleich lang und einfach. Eine Vergleichung mit den entsprechenden Arten in Theobald's Monographie ergibt keine Uebereinstimmung.

Weibchen. Thorax matt rotbraun, auf dem Rücken ohne deutliche dunklere Längslinien, gleichmässig mit bronzefarbigen Schuppen bedeckt und mit zwei Reihen brauner Borsten auf der Mitte; schwarzbraune Borsten mit heller Spitze stehen desgleichen am Rande des Schildens und an den Seiten über der Flügelwurzel. Brustseiten und Hüften zeigen eine Reihe schneeweisser Schuppenflecke. Kopf schwarzgrau; auf der Mitte der Stirn liegt ein auch über den Hinterkopf sich verbreitender schneeweisser Schuppenstreifen; derselbe setzt sich fort über das Gesicht, bedeckt den Clypeus und bildet auf dem letzten Tastergliede zwei auffallend schneeweisse Flecken. Rüssel und Fühler schwarzbraun; das Wurzelglied der letzteren hat einen weissen Schuppenring. Schwinger blassbraun. Hinterleib stark glänzend von hell rostgelber bis bräunlicher Farbe; auf der Oberseite liegen schmutzig weisse Schuppen, deren Ansammlung an den Einschnitten etwas stärker zu sein scheint, ohne dass man von einer Bindenzeichnung sprechen könnte. Schenkel und Hüften hellrostgelb, erstere mit schwarzen Längsstreifen, an der Spitze ganz verdunkelt. Kniee an allen Beinen mit schneeweissem Fleck. Schienen schwarz und Tarsen braun; an den Vorderbeinen sind der Metatarsus und das folgende Glied an ihrer Wurzel schmal weiss geringelt; das letzte Tarsenglied ist rostgelb; an den Mittelbeinen sind ebenfalls die beiden ersten Tarsenglieder weiss geringelt und die letzten drei Glieder fast ganz rostgelb; an den Hinterbeinen sind die vier ersten Tarsenglieder breit weiss geringelt und zwar bedeckt der weisse Ring auf dem Metatarsus reichlich ¼ seiner Länge, auf den beiden folgenden Gliedern ⅓ und auf dem vierten Ringe ¾; das letzte Glied ist ganz schneeweiss. Borsten der Schienen namentlich an den Hinterbeinen deutlich und weiss. Die Klauen sind alle ohne Zähne, einfach und gleich lang. Länge der Schienen und Tarsen bei 13facher Vergrösserung: Vorderschiene 36, Metatarsus und die folgenden Glieder 19, 10, 5, 3, 3 mm.; an den Hinterbeinen: Schiene 40, Metatarsus und die folgenden Glieder 22, 15, 12, 7, 4 mm. Das Verhältnis der Schiene zu ihrer Tarsen

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ist also an den Vorderbeinen wie 9: 10, an den Hinterbeinen wie 2: 3. Flügel an ihren Adern gleichmässig und stark schwarzbraun beschuppt; die erste gegabelte Submarginalzelle ist 2½ mal so lang wie ihr Stiel; der Stiel der zweiten Hinterrandzelle ist so lang wie ihr unterer Gabelzweig. Körperlänge 4 mm.

DESCRIPTION OF FEMALE, MALE, LARVA, PUPA, AND EGG OF AËDES CALOPUS:

Female.—Proboscis moderately long and stout, subcylindrical, uniform, labellæ conically tapered; vestiture black; setæ small, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth the length of the proboscis; vestiture black, tips very broadly white-scaled above. Antennæ filiform, the joints subequal, rugose, pilose, black, second joint fusiform; tori subspherical, with a cup-shaped apical excavation, blackish, clothed with broad silvery-white scales on nearly the entire surface; hairs of whorls rather long, sparse, black. Clypeus prominent, rounded triangular, convex with a slight median impression, sordid-brown, clothed with broad silvery-white appressed scales. Eyes black. Occiput blackish, clothed with broad scales, blackish-brown on the sides, a silvery-white median dorsal stripe (sometimes divided, showing a black median groove) which is continued forward between the eyes to base of antennæ; eye-margin narrowly silvery-white scaled; two white bars traversing the dark area well down on the sides; some pale-yellowish, erect, forked scales well back on the nape.

Prothoracic lobes elliptical, remote dorsally, clothed with silvery-white scales in the middle, black scales above and below, and with many black bristles. Mesonotum black, clothed with narrow, curved bronzy-brown scales, a very short white line in the middle at anterior edge followed by two narrow silvery lines which are continued almost to the antescutellar space, a broader silvery-white band on either side, strongly curved outwardly and forming a crescent to beyond middle of lateral area, where it is joined to a fine white line which continues to posterior margin; antescutellar space edged with white, a short median stripe before antescutellar space; a white patch at roots of wings. Scutellum trilobate, densely clothed with silvery-white scales except apex of middle lobe, which is brown; a group of coarse brown bristles on each lobe. Postnotum elliptical, prominent, brown, nude. Pleuræ and coxæ brown, clothed with patches of flat silvery-white scales and rows of pale bristles.

Abdomen subcylindrical, tapering posteriorly; dorsal vestiture black with a slight greenish reflection, a narrow white band not reaching sides at base of each segment except on the last, a row of silvery-white, triangular, lateral segmentary spots, the points of the triangles touching bases of segments; first segment yellowish-white scaled, a few black scales at the sides, and with many fine pale hairs; venter yellowish silvery-white scaled with a few black scales intermixed, sixth segment with broad apical black band, seventh segment entirely black beneath. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell much shorter than its cell, that of second posterior cell somewhat longer; basal cross-vein distant more than its own length from anterior cross-vein; scales brown, the outstanding ones broadly linear, those on second vein denser and broader. Halteres yellowish-white.

Legs rather slender, moderately long; femora black, white beneath at base, front and middle pair with a broad white line on inner side, hind pair with a fine white line on outer side; knees white; tibiæ brownish-black; hind tarsi with rather broad white rings at bases of joints, the last joint entirely white; fore and mid tarsi with white rings at bases of first two joints only. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

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Male.—Proboscis straight, long and slender. Palpi as long as the proboscis, slender, uniform; terminal joints with a few stiff setæ; vestiture black, with four white rings, situated at base and middle of long joint and at bases of last two joints, the one at middle of long joint broad. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, whitish, with black rings at insertions of hair-whorls; hairs of whorls fine, rather dense, brown. Coloration similar to the female. Abdomen elongate, strongly depressed, the sixth and seventh segments broadened apically; dorsal vestiture black, the second to sixth segments with laterally abbreviated basal white bands, absent on seventh and eighth segments, the fifth to eighth segments with lateral or sublateral silvery spots; venter with first to sixth segments basally yellowish-silvery scaled and apically black-scaled, the black becoming fused into a median line on basal three segments, seventh and eighth segments black-scaled; lateral ciliation sparse, of rather coarse pale hairs. Wings narrower than in the female, the stems of the fork-cells longer; vestiture less abundant. Claw formula, 1.0–0.0–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 33, fig. 224): Side-pieces about one and one half times as long as wide, tips conically tapered, without apical or basal lobes, but the inner halves covered with fine hairs. Clasp-filament slightly enlarged in middle, stout, with a short apical articulated spine. Harpes flat, plate-like, with a long projection at base inward, tips rounded and excurved, a thin pilose membrane between, squarely emarginate in middle. Harpagones wanting. Unci approximate, not confluent, with revolute margins and serrated tips. Basal appendages wanting.

Egg (plate 145, fig. 668, and plate 147, fig. 684).—Fusiform, black, very slightly flattened on one side, slightly more tapered toward the micropylar end; sculpture of rough, somewhat irregular rhomboidal callosities forming spiral rows. Length .53 mm., diameter .15 mm.

Larva, Stage IV (see figure of the entire larva, plate 76).—Head rounded, wider than long, widest behind eyes, a slight notch at insertion of antennæ, front margin broadly arcuate. Antennæ small, cylindrical, slightly curved, smooth, a single hair at middle; four terminal stout spines, two long, two short, a small digit articulated on a pedestal. Eyes large, transverse, pointed. Both pairs of dorsal head-hairs and ante-antennal hairs simple, all short. Mental plate rounded triangular, central tooth large, with twelve on each side, subequal, the median ones approximated, the outer ones more remote and slenderer. Mandible subquadrate, nearly smooth without; two filaments before a notch near tip; an outer row of coarse cilia; a row of small filaments beyond; dentition of four teeth, the first largest, a group of filamentous processes at base, feathered setæ within; a lobe below as long as the dentition, furcate at tip, setose; five long hairs below; five still larger ones at base. Maxilla elongate hemispherical, divided by a narrow suture; inner half with a notch at the end of a row of processes, hairy, a tuft of long hairs at tip; outer half with two processes on one side and one on the other; palpus short, arising from outer side of maxilla and appressed to it, less than twice as long as wide, with two very small terminal digits. Thorax rounded, wider than long; hairs moderate, rather sparse. Abdomen rather long, sixth and seventh segments elongated; lateral hairs of first segment quadruple, triple on second to fourth, double on fifth, single on sixth; tracheal tubes broad, band-shaped. Air-tube stout, short, strongly tapered on outer half, over twice as long as wide; pecten running nearly halfway, followed by a single tuft of few hairs; single pecten-tooth a rather long spine with two large and some small teeth within and small ones without.

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Lateral comb of the eighth segment of ten scales in a single row, the single scale elongate with a pointed base, a long apical spinule and curved stout subapical ones followed by several slender lateral ones. Anal segment short, wider than long, almost ringed by the plate, which nearly touches ventrally, but is not united; dorsal tuft a pair of hairs on each side; ventral brush moderate, directed posteriorly; anal gills long, wide, tracheate, the tips rounded.

Pupa (plate 150, fig. 713).—Cephalothoracic mass subpyriform, compressed ventrally and posteriorly; respiratory trumpets short, strongly flaring, obliquely truncate. Abdomen rather stout, the hairs sparse and weak; eighth segment with small sparse tuft at apical angles; anal paddles large, with a simple apical bristle.

Under natural conditions the eggs are laid singly in small irregular groups some distance above the margin of the water. The investigations of Finlay and others show that unless the fertilized female obtains a meal of blood the eggs do not mature but remain latent within the body. The eggs are laid in from 1 to 7 days after the female has fed upon blood. Usually the eggs are not all laid at once but at intervals after successive blood-meals.

The larvæ live in accumulations of water in artificial receptacles. From being originally a tree-hole inhabiting species, it is now wholly domesticated, and its larva inhabits artificial accumulations of water either within houses or in the vicinity of human habitations. Occasionally the larvæ occur in holes in trees, but always in proximity to habitations. Goeldi has found the larvæ in water held by bromeliads, presumably near houses, and by the still folded leaves of banana plants. In the tropics the earthen jars in which drinking water is kept within dwellings are a favorite breeding-place; the larvæ have the habit of keeping to the bottom, and, as these jars are never emptied, their presence is not even suspected. Thus water may be poured from the small earthen bottles used in hotels in the tropics, and, unless the bottle is quickly and completely emptied, the larvæ will remain behind. Holy-water founts in churches are a favorite breeding-place. Out of doors the larvæ occur in tanks, barrels, rain-troughs and discarded bottles and tins. The larvæ, when suspended from the surface film, hang nearly perpendicular. They can remain below the surface a long time. In the experience of Goeldi and Knab they prefer clear water and while this is generally true Busck has upon two occasions found the larvæ in very foul water. According to Peryassú the larvæ will develop in a mixture of 40 per cent sea water with 60 per cent of fresh. He further states that the larvæ thrive very well in water containing food-refuse, such as cured or fresh meat and farinaceous products or fats, and that they do best in muddy water or such as contains an abundance of dead leaves and fragments of wood. Peryassú states that the larva is predaceous and cannibalistic. We have observed them feeding upon dead larvæ but have never seen them attack living ones.

The habits of the imago are strictly diurnal. They frequent habitations and the female probably only leaves the house in quest of a suitable place for oviposition. Both sexes are attracted to man. The females are persistent biters, although very stealthy in their attacks. They have developed the habit of approaching from behind and when disturbed will retreat to a dark corner and wait a while before returning to the attack. The bite is often imperceptible and leaves comparatively little irritation. Unlike many other mosquitoes they emit no sound when about to bite. The male likewise persecutes man and this has led to the widely quoted statement of Ficalbi that it sucks blood; however, it does not pierce the skin but laps sweat from the surface and in this way causes some irritation. This mosquito is most active during the warm hours of sun-

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light. In cool, rainy weather it remains quiescent in its retreats in dark corners or upon dark clothing. For these latter it has a special predilection as a resting place.

Copulation occurs in warm weather during the hot, sunny hours of the day. According to Goeldi the males congregate in little swarms of 15 to 20 or more, hovering over the edge of a table, cabinet or other object, or over a person. When a female approaches one of these little swarms it is pounced upon by a male. Copulation is effected during flight, the male clasping the female from beneath, and is quickly accomplished. The flight is so short that, according to Goeldi, copulation is easily effected in a breeding-cage.

The eggs develop best after having remained dry for a period. When in contact with water or submerged they develop rapidly under high temperatures. According to Peryassú the eggs hatch regularly at temperatures from 25° to 29° C. (=77° to 84° F.) and all the eggs deposited at one time hatch together. At these temperatures the time of hatching is from 3 to 8 days. Below 25° C. (77° F.) only part of the eggs hatch and these irregularly. A fall of temperature to 20° C. (68° F.) for even a single night either retards hatching or prevents it. Low temperatures have a decidedly bad effect upon the development of the larvæ.

These facts stand in intimate relation to the distributions of the species. It is found established only in territory with more or less uniformly high temperatures. In the more temperate regions it is frequently introduced during the warmer season by traffic from farther south and then exterminated by the cold winter weather. This is the case, for example, in the southerly part of the United States, where the species is endemic only below the frost line. Owing to its close association with man it is often carried by vessels and railroads and thus temporarily established far to the north of its permanent habitat. In Europe it has been found as far north as England and in America it must have once found a foothold in Boston, Massachusetts, as a considerable epidemic of yellow fever occurred there. A full discussion of the habits will be found in volume one of this work, pages 258 to 303.

Endemic in tropical regions of both hemispheres, seasonally introduced in temperate regions.

Washington, District of Columbia, July 3, 1901 (J. Carroll); August 28, 1908 (R. W. Van Horn); Norfolk, Virginia (R. Blue); Virginia Beach, Virginia, August 25, 1900 (F. C. Pratt); Columbia, South Carolina, September 12, 1908 (W. H. Sligh); Thomasville, Georgia, October, 1905 (W. W. Jarrell); Myrtle, Georgia, September 1, 1906 (A. A. Girault); Fort Valley, Georgia (J. H. Beattie); Savannah, Georgia, August 8, 1901 (T. E. Oertel); St. Louis, Missouri, August to October, 1904 (A. Busck); Memphis, Tennessee, July 29, 1904 (H. S. Barber); Tuscumbia, Alabama, August 15, 1904 (H. S. Barber); Richmond, Kentucky, August 25, 1904 (H. S. Barber); Lexington, Kentucky, October 19, 1901 (A. M. Miller); Nashville, Tennessee, August 17, 1904 (H. S. Barber); Columbia, Tennessee, August 16, 1904 (H. S. Barber); Athens, Tennessee August 22, 1904 (H. S. Barber); Chattanooga, Tennessee, August 20, 1904 (H. S. Barber); Decherd, Tennessee, August 18, 1904 (H. S. Barber); Scott, Arkansas, September 1, 1908 (J. K. Thibault, Jr.); Hot Springs, Arkansas, October 1, 1900 (A. Wright); Baton Rouge, Louisiana (J. W. Dupree); New Orleans, Louisiana, September 21, 1900 (H. A. Veazie); Napoleonville, Louisiana, November 7, 1900 (L. E. Flannagan); Belzona, Mississippi, August 5, 1904 (H. S. Barber); Westpoint, Mississippi, August 11, 1904 (H. S. Barber); Helena, Arkansas, July 30, 1904 (H. S. Barber); Jackson, Mississippi, August 7, 1904 (H. S. Barber); Winona, Mississippi,

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August 9, 1904 (H. S. Barber); Tupelo, Mississippi, August 13, 1904 (H. S. Barber); Miami, Florida, March 9, 1905 (Dyar and Caudell); Key West, Florida, March 10, 1905 (Dyar and Caudell); Punta Gorda, Florida, March 19, 1905 (A. N. Caudell); Bartow, Florida, March 20, 1905 (A. N. Caudell); Barrancas, Florida, June 28, 1901 (A. H. Gale); Knoxville, Tennessee, August 28, 1901 (S. R. Miller); on train between Tutwiler and Yazoo City, Mississippi, August 3, 1904 (H. S. Barber); Clarksdale, Mississippi, August 2, 1904 (H. S. Barber); New Iberia, Louisiana, October 5, 1905 (E. S. G. Titus); Paris, Texas, July 27, 1904 (F. C. Bishopp); Dallas, Texas, June 27, 1904 (H. S. Barber); Trinity, Texas, August 9, 1906 (F. C. Bishopp); Victoria, Texas, April 24, 1904 (H. S. Barber); Brownsville, Texas, May 11, 1904 (H. S. Barber); Corsicana, Texas, June 13 (S. Joes); Spanish Wells, George Island, Bahamas, July 4, 1903 (T. H. Coffin); Nassau, New Providence, Bahamas, July 2, 1903 (T. H. Coffin); Governors Harbor, Eleuthera, Bahamas, 1903 (T. H. Coffin); Current Settlement, Eleuthera, Bahamas, July 5, 1903 (T. H. Coffin); Tarpum Bay, Eleuthera, Bahamas, July 7, 1903 (T. H. Coffin); Clarence Harbor, Long Island, Bahamas (T. H. Coffin); San Salvador, Bahamas (T. H. Coffin); Baracoa, Cuba, September, 1901 (A. Busck); Cayamas, Cuba, May 17 (E. A. Schwarz); Columbia Barracks, Cuba, May 8, 1901 (T. R. Kean); Bayamon, Cuba, November, 1900 (W. Reed); Havana, Cuba, June, 1901 (Major Laine); Guantanamo, Cuba, July 26, 1901 (J. M. Espin); Ciego de Avila, Cuba, January 6, 1909 (W. H. Sligh); Quemados, Cuba (———); Santiago, Cuba, October, 1901 (A. Busck); Pinar del Rio, Cuba, 1900 (———); Isle of Pines, Cuba (S. H. Scudder); Santo Domingo City, Santo Domingo, August, 1905 (A. Busck); San Francisco Mountains, Santo Domingo, September, 1905 (A. Busck); Kingston, Jamaica, July 15, 1891 (T. D. A. Cockerell); Mayaguez, Porto Rico, September (W. V. Tower); Viques Island, Porto Rico, July 28, 1910 (C. C. Craft); Culebra, Porto Rico, January 26, 1904 (A. C. H. Russell); St. Thomas, Danish West Indies, August, 1905 (A. Busck); Dominica, July 28, 1905 (A. Busck); Martinique, July 24, 1905 (A. Busck); Plymouth, Montserrat (F. E. Driver); Barbados, July, 1905 (C. Todd); Nevis, October, 1907 (through H. A. Ballou); La Paz, Baja California, Mexico (A. Dugès); Tampico, State of Tamaulipas, Mexico (J. Goldberger); Frontera, State of Tabasco, Mexico, May 15, 1903 (A. Dugès); Córdoba, State of Vera Cruz, Mexico, June 14, 1905 (F. Knab); Rincon Antonio, State of Oaxaca, Mexico, June 23, 1905 (F. Knab); Tehuantepec, State of Oaxaca, Mexico, July 5, 1905 (F. Knab); Salina Cruz, State of Oaxaca, Mexico, July 13, 1905 (F. Knab); Acapulco, State of Guerrero, Mexico, July 28, 1905 (F. Knab); Vera Cruz, State of Vera Cruz, Mexico (G. E. Beyer); Nautla, State of Jalisco, Mexico (A. Dugès); Pochutla, State of Oaxaca, Mexico (A. Dugès); San Blas, Territory of Tepic, Mexico (A. Dugès); Coatzacoalcos, State of Vera Cruz, Mexico (A. Dugès); Las Peñas, State of Jalisco, Mexico (A. Dugès); Mazatlan, State of Sinaloa, Mexico (A. Dugès); Perihuete, Mexico (A. Dugès); Tuxpam, State of Vera Cruz, Mexico (A. Dugès); Belize, British Honduras (R. H. Peters); Champerico, Guatemala, August 4, 1905 (F. Knab); on boat between Livingstone and Panzos, Guatemala, March 22, 1906 (Schwarz and Barber); San José, Guatemala, August 6, 1905 (F. Knab); Livingstone, Guatemala, May 9, 1906 (Schwarz and Barber); Sonsonate, Salvador, August 28, 1905 (F. Knab); San Salvador, Salvador, August 14, 1905 (F. Knab); Corinto, Nicaragua, September 4, 1905 (F. Knab); Bluefields, Nicaragua (W. F. Thornton); Puntarenas, Costa Rica, September 7, 1905 (F. Knab); San José, Costa Rica, September 22, 1905 (F. Knab); Port Limon, Costa Rica, September 27, 1905 (F. Knab); Esparta, Costa Rica, September 18, 1905 (F. Knab); Bocas del Toro, Panama (———);

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Taboga Island, Panama (P. P. Preston); San Pablo, Canal Zone, Panama, May 7, 1907 (A. Busck); Pedro Miguel, Canal Zone, Panama, May 29, 1907 (A. Busck); La Boca, Canal Zone, Panama, June 12, 1907 (A. Busck); Colon, Panama (A. Busck); Ancon, Canal Zone, Panama, November 23, 1907 (A. H. Jennings); Bas Obispo, Canal Zone, Panama, December 12, 1907 (A. H. Jennings); Panama City, Panama, December 4, 1907 (A. H. Jennings); Porto Bello, Panama, January 21, 1908 (A. H. Jennings); Gatun, Canal Zone, Panama, March 12, 1908 (A. H. Jennings); Mirafiores, Canal Zone, Panama, December 10, 1907 (A. H. Jennings); Cedros, Trinidad, June 18, 1905 (A. Busck); St. Joseph, Trinidad, June 12, 1905 (A. Busck); Port of Spain, Trinidad, June 11, 1905 (A. Busck); Montserrat, Trinidad, July 4, 1905 (A. Busck); New Amsterdam, British Guiana, May, 1907 (J. Aiken); Omai, British Guiana (K. S. Wise); Georgetown, British Guiana (E. D. Rowland); Paramaribo, Dutch Guiana (H. Polak); Guayaquil, Ecuador (F. Campbell); Maceió, Alagoas, Brazil, December, 1911 (G. A. Waring); São Paulo, Brazil (A. Lutz); Rio de Janeiro, Brazil, July 19, 1907 (O. Cruz); Campinas, Brazil, January 22, 1902 (A. Hempel); Hilo, Hawaii, April 5, 1902 (H. W. Henshaw); Kaiwiki, Hawaii, 1700 ft. (W. A. Ashmead); Honolulu, Oahu, March 21, 1901 (C. L. Marlatt); Apia, Samoa, November, 1904 (J. T. Floyd); Okayama, Japan, May 5, 1901 (C. L. Marlatt); Manila, Luzon, January, 1904 (———); Iloilo, Iloilo, Panay, December 22, 1903 (G. W. McCoy); Cebu (———); Guam (C. P. Bagg); Hagonoy, Bulucán, Luzon, September 1, 1902 (C. S. Ludlow); Iligan, Mindanao, January, 1902 (P. B. Grubbs); Santa Cruz, Luzon (C. S. Ludlow); Samal, Butaan (through C. S. Ludlow); Catalato, Mindanao, October, 1906 (C. H. Halliday); Parang, Mindanao (through C. S. Ludlow); Ormoc, Leyte, July 1, 1906 (C. H. Halliday); Soekaboemi, Java, December 20, 1901 (C. L. Marlatt); Garoet, Java, December 9, 1901 (C. L. Marlatt); Singapore, Straits Settlements, November 18, 1901 (C. L. Marlatt); Ismaïlia, Egypt (W. C. Gorgas); Malaga, Spain, December, 1908 (C. Visich). Also reported from numerous other localities in the warmer portions of both hemispheres.

The earliest name for this species, *Aëdes argenteus* (Poiret), has come to our notice too late for incorporation in this work. Fabricius, in 1805, named the species *Culex fasciatus*, but other species had been previously described under the same name by O. F. Müller (Fauna Insectorum Fridrichsdalina, p. 87, 1764), and Meigen (Klassif. u. Beschr. d. europ. zweifl. Ins., p. 4, 1804). The first use of the name *Culex fasciatus* has been generally credited to de Villers (1789) on the authority of R. Blanchard (Les Moustiques, p. 250, 1905). E. E. Austen has recently shown that a mosquito was first described under this name by Müller as above cited and that de Villers merely quoted this description (Yellow Fever Bureau Bull., ii, 3, 1912). We use here the name *Aëdes calopus* (Meigen).

C. S. Banks has redescribed typical *Aëdes calopus* under the name *Stegomyia fasciata persistans*, having found slight differences between his specimens and published figures; these differences, however, do not exist in nature. Considerable variation occurs in the coloring of the scale vestiture, particularly of the mesonotum. The ground-color of the mesonotum varies from deep brown to golden brown and rust-red, with varying degrees of submetallic luster; in some specimens the pair of narrow median silvery stripes is obsolete or nearly so. Sometimes the mesonotal ground-color is very light grayish or brownish, with strong metallic luster, so that the typical silvery markings are hardly discernible. Theobald notes purple scales on the scutellum of some Australian specimens. The ground-color of the abdomen is more constant, but specimens occur in which there is a pale, submetallic, median longitudinal stripe and in still others all the black scales, even on the legs, are replaced by such pale ones. Variations in the tarsal ornamentation have been also noted. None of these variations appear to have the character of local races or subspecies and we do not consider them worthy of the varietal names introduced by some authors.

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AËDES KNABI (Coquillett) Dyar & Knab.

Culex knabi Coquillett, Proc. Ent. Soc. Wash., vii, 183, 1906.
Aëdes knabi Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 203, 1906.
Aëdes knabi Dyar, Proc. Ent. Soc. Wash., viii, 16, 1906.
Ochlerotatus knabi Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 18, 1906.
Culex knabi Theobald, Mon. Culic., v, 612, 1910.

ORIGINAL DESCRIPTION OF CULEX KNABI:

Proboscis and palpi black-scaled; head, thorax and scutellum yellow, their scales and hairs golden yellow, pleura with a few patches of white scales. Abdomen purple-scaled, front angles of the segments yellow-scaled; venter yellow-scaled and with an apical band of purple ones on the last four segments. Femora and tibiae purple-scaled, the basal half of the hind femora and the bases of the others, especially on the posterior side, yellow-scaled; bases of the first three tarsal joints white-scaled, covering nearly the whole of the first two joints on the middle and hind tarsi, scales on remaining portions of tarsi purple; all tarsal claws toothed. Wings hyaline, the scales brown. Length 5 mm.

Tehuantepec, State of Oaxaca, Mexico. Seven females collected by Mr. Frederick Knab, for whom this elegant species is named.

***Type.*—No. 8289, U. S. National Museum.**

DESCRIPTION OF FEMALE AND LARVA OF AËDES KNABI (MALE UNKNOWN):

Female.—Proboscis rather stout, subcylindrical, slightly enlarged at tip; labellæ conically tapered; vestiture black; setæ rather long, curved, black, those on labellæ shorter and more prominently outstanding. Palpi moderate, over one-fourth as long as the proboscis; vestiture black, setæ moderate, stiff. Antennæ filiform, the joints subequal, rugose, coarsely pilose, brown; second joint slightly enlarged medianly, yellow on basal half; tori subspherical, with a cup-shaped apical excavation, entirely ochraceous, a few fine black hairs on inner side; hairs of whorls rather short, sparse, black. Clypeus rounded-triangular, prominent, brownish-luteous, nude, shining. Occiput yellowish, brown in the middle, clothed very broadly with narrow, curved scales on the vertex, flat ones on the sides, light golden yellow; cheeks and under surface yellowish-silvery scaled; many erect forked golden scales on nape; bristles along margins of eyes black, those projecting forward between the eyes golden.

Prothoracic lobes elliptical, remote dorsally, yellow, clothed with a few golden scales and brown bristles; mesonotum ocher yellow, rather densely clothed with narrow curved golden scales, two narrow, submedian longitudinal lines of slightly darker integument, nude on anterior margin, clothed with golden scales and some narrow hair-like black scales intermixed; bristles over roots of wings and about antescutellar space golden. Scutellum trilobate, pale luteous, each lobe with golden scales, broad on the mid-lobe, and a large group of yellow bristles. Postnotum elliptical, prominent, pale luteous, nude. Pleuræ and coxæ ochraceous, clothed with small patches of triangular, flat white scales and rows of pale bristles.

Abdomen subcylindrical, tapering posteriorly; dorsal vestiture black with a submetallic violet reflection, a row of segmentary, lateral, basal, subquadrate yellowish-silvery or golden patches, becoming larger on posterior segments and dorsally visible on five, six and seven; eighth segment with broad basal golden band dorsally; first segment mostly dark-scaled and with many fine pale hairs; venter with vestiture violet-black, with golden segmental basal bands becoming much broadened at the sides. Cerci black.

Wings rather narrow, hyaline, slightly infuscated towards costa; petiole of second marginal cell shorter than its cell, that of second posterior cell about equal to its cell; basal cross-vein more than twice its own length from anterior cross-vein; scales of veins dull brown, those on costa blue-black, the outstanding ones narrowly ligulate, denser on second vein. Halteres whitish, knobs with yellowish white scales.

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Legs rather slender, moderately long; vestiture black with a blue reflection; femora ochraceous towards base; front and middle knees narrowly silvery-white scaled; scales of tibiæ somewhat outstanding; fore tarsi with first joint basally three-fourths white, second joint basally white; mid tarsi with first joint entirely white except extreme apex, second joint basally three-fourths white, third joint with some white scales at base; hind tarsi with a sprinkling of pale scales on basal half of first joint, second joint with basal half white, third joint with a short white mark at base. Claw formula, 1.1–1.1–1.1.

Length: Body about 6 mm.; wing 5.5 mm.

Larva, Stage IV (plate 121, fig. 418).—Head rounded, about as wide as long, slightly narrowed before eyes, a notch at insertion of antennæ, front margin obtusely pointed. Antennæ moderate, slender, smooth, with a single hair at middle; three spines at tip and a digit on a long pedestal. Eyes moderate. Both pairs of dorsal head-hairs single; ante-antennal tufts three-haired. Mental plate broad and shortly triangular, with a prominent central tooth and ten on each side, of which the first eight are small and regular, the last two very large and produced. Mandible subquadrangular, spined without at base; two filaments from a notch before tip; an outer row of cilia from a collar; a row of slender filaments from angular projections on outer margin; dentition of four teeth, the first largest; a long spine before, a broad filament and five serrate hairs within; process below shortly bilobed, a broad rounded prominence on outer side and a short one within on basal lobe, a straight row of hairs ending in a tuft; basal angle very slight; a scattering row of five large hairs within; a row of long hairs at base. Maxilla subcylindrical, rounded at tip, twice as long as wide, divided by a band-shaped suture; inner half with a row of long coarse hairs near the suture; a cap of large, coarse, round-tipped spines covering apical end of maxilla, directed slightly inwards; a single filament from middle of outer half next the suture and a long spine near tip; palpus small and rather slender, with four approximated digits at apex. Lateral hairs of abdomen in threes on third to fifth segments. Air-tube conically tapered, about three times as long as wide; pecten of very dense, coarse short teeth running to middle of tube, followed by a single long hair; single pecten-tooth a broad stout spine with two or three stout basal branches. Lateral comb of eighth segment an irregular patch of few scales; single scale elliptical, evenly fringed with stout spinules, of which the terminal three are longer. Anal segment a little longer than wide, with a dorsal plate reaching over halfway down the sides; dorsal tuft a long hair and brush on each side; a single lateral hair; ventral brush well developed, preceded by some small tufts along ventral line; anal gills short and broad, lanceolate, showing a very slight central trachea.

The larvæ live in the water in hollow trees. Mr. Knab got them twice in such situations, once in the forest, far from habitations and unassociated with other species, and once in town and associated with other tree-hole inhabiting mosquito larvæ.

Semi-arid region of southern Mexico.

Tehuantepec, State of Oaxaca, July 1, 1905 (F. Knab); Salina Cruz, State of Oaxaca, July 15, 1905.

Aëdes knabi varies in the thoracic ornamentation of the imago. In some of our specimens the two longitudinal lines are hardly perceptible, while in others the lines are very distinct, owing to the predominance of the black hair-like scales. Some specimens also show indistinct darker areas basally above roots of wings.

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AËDES HORTATOR Dyar & Knab.

Aëdes hortator Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 12, 1907.
Aëdes hortator Theobald, Mon. Culic., v, 485, 1910.

ORIGINAL DESCRIPTION OF AËDES HORTATOR:

Proboscis and palpi black; thorax yellowish, the vestiture consisting of golden yellow and bronzy brown scales intermixed, the yellow predominating; abdomen violet black, the fifth and sixth segments with white basal lateral patches, beneath white; legs dark, hind femora white with black apices. Wing veins brown scaled. Claws of the female toothed.

2 specimens, Trinidad, B. W. I. (F. W. Urich).

Type.—Cat. No. 10250, U. S. Nat. Mus.

DESCRIPTION OF FEMALE OF AËDES HORTATOR (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather long, uniform, labellæ conically tapered; vestiture black; setæ small, curved, brownish, those on labellæ more prominently outstanding. Palpi small, about one-sixth as long as the proboscis; vestiture black, setæ moderate, stiff. Antennæ filiform, the joints subequal, pilose, rugose, black; second joint slightly thickened towards middle, yellowish at base; tori subspherical, with a cup-shaped apical excavation; ochraceous in apical depression, brownish-black externally; hairs of whorls long, sparse, black. Clypeus rounded triangular, depressed, with a narrow median groove, brownish, nude. Occiput yellow, clothed with flat appressed scales, broadly blue-black in the middle, a narrow margin along eyes and the lower part of the sides yellow-scaled; a number of erect pale forked scales on nape; bristles along margins of eyes and those projecting between the eyes black.

Prothoracic lobes elliptical, remote dorsally, yellow, with some coarse brown bristles. Mesonotum brownish-yellow; vestiture of dense, narrow curved brownish-black scales with golden-brown luster; bristles on anterior margin, over roots of wings and about antescutellar space coarse, brown. Scutellum trilobate, brownish-luteous, clothed with brownish-black scales, those on mid lobe broadly triangular, each lobe with a group of brown bristles. Postnotum elliptical, prominent, brownish-luteous, nude. Pleuræ and coxæ light ocher yellow, with rows of pale bristles.

Abdomen subcylindrical, tapering posteriorly, ventrally produced into a longitudinal ridge, the fifth, sixth and seventh segments somewhat expanded apically; dorsal vestiture black with a bluish reflection, a row of lateral, segmentary, basal, triangular silvery-white patches, larger and dorsally produced on fifth, sixth and seventh segments; first segment with dull black scales and many fine pale hairs; venter with yellowish vestiture, the distal segments with black apical bands, seventh segment black. Cerci black.

Wings moderate, hyaline; petiole of second marginal cell half as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein more than its own length from anterior cross-vein; scales dark brown, costa with a blue reflection, the outstanding scales narrowly ligulate, dense and broader on second vein. Halteres whitish, the knobs black scaled.

Legs slender, moderately long; vestiture black with a blue reflection; hind femora silvery-white scaled beneath and outwardly nearly to tip, dorsally on basal three-fourths; setæ of tibiæ long. Claw formula, 1.1–1.1–1.1.

Length: Body about 4 mm.; wing 3.5 mm.

The adults were received from Mr. F. W. Urich, and were apparently bred from water held by the leaf-bases of Bromeliaceæ, but we have no positive assurance on the point.

Island of Trinidad, West Indies.

Arima (F. W. Urich).

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AËDES FULVITHORAX (Luts).

Gualteria fulvithorax Lutz in Bourroul, Mosq. do Brasil, 47, 1904 (nomen nudum).
Hæmagogus fulvithorax Luts in Bourroul, Mosq. do Brasil, 66, 1904.
Gualteria fulvithorax Luts, Imprensa Medica, 1905, 67, 1905.
Taniorhynchus palliatus Coquillett, Can. Ent., xxxviii, 61, 1906.
Hæmagogus fulvithorax Dyar & Knab, Proc. Biol. Soc. Wash., xix, 167, 1906.
Taniorhynchus palliatus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. ser. no. 11, 24, 1906.
Gualteria fulvithorax Theobald, Mon. Culic., iv, 552, 1907.
Gualteria fulvithorax Peryassú, Os Culic. do Brasil, 45, 179, 1908.
Gualteria fulvithorax Theobald, Mon. Culic., v, 607, 1910.
Taniorhynchus (?) palliatus Theobald, Mon. Culic., v, 432, 1910.

ORIGINAL DESCRIPTION OF GUALTERIA FULVITHORAX:

(FEMEA.) Comprimento total 5 mm., sem a tromba que mede 3 mm.

Trombo—Fina, do comprimento do abdomen, guarnecida de pellos finos na porção apical, de côr parda ennegrecida.

Palpos—Amarellos, com escamas e pellos pretos.

Clypeus—Proeminente e arredondado, côr de castanha.

Antennas—Pellos maiores pretos e outros, mais curtos, esbranquiçados; os tori de côr de ouro ennegrecido do lado interno. Região frontal proeminente, côr de ouro.

Occiput—Preto, guarnecido no meio de escamas fusiformes, estreitas e curvadas, côr de ouro pallido; dos lados, de outras chatas e imbricadas, e por traz com uma colleira de escamas erectas e bifurcadas; ha tambem pellos dourados bastante grandes e curvados para diante.

Lobulos prothoracicos—Escamas e pellos eguaes aos do occiput.

Mesonotum—Escamas eguaes ás da parte media do occiput.

Pleuras—Pequenas escamas chatas, lanceoladas, de côr branca um pouco amarellada, formando 8 grupos cada um de 10 para 20 escamas.

Scutellum—Escamas pretas, chatas e pellos compridos, havendo pelo menos 6 de cada lado e 4 no meio.

Metanotum—Nú, de côr parda de veado.

Abdomen—Em cima, preto, com manchas semilunares basaes, claras, occupando o 2º, 3º, 4º e 5º segmentos, sendo um pouco mais extensas no 6º; dos lados ha grandes manchas brancas, tomando a metade basal e estendendo-se sobre o plano ventral; na linha mediana ventral domina uma côr amarella dourada; os ultimos segmentos são lateralmente comprimidos, estreitos na base, alargados e salientes do lado ventral no seu apex e terminando-se obliquamente, tendo a extremidade guarnecida de escamas pretas e pellos amarellos.

Pernas—No par anterior a coxa e a parte basal inferior do femur são de côr pardacenta clara; a tibia e o pé, mais ennegrecidos, havendo algumas escamas mais claras na articulação da tibia com o metatarso; no segundo par o femur é amarello na base e do lado ventral, em cima coberto de escamas pretas, marcado no apex com um ponto branco; a tibia e o pé, pretos, com reflexos mais claros, sendo o ultimo tarso de côr de bronze; no par posterior o femur tem os ⅔ anteriores de côr pardo-amarella, o ultimo ⅓ preto com ponto apical branco; a tibia é preta e um pouco branca no apex, o metatarso com estreita faxa basal de côr branca; no resto é preto como os tarsos que são apenas um pouco mais claros na base. Unhas inermes e eguaes; as dos 4 pés anteriores um pouco maiores.

Asas—Escamas do typo de culex; primeira cellula forqueada, comprida e estreita; segunda, menor e um pouco mais larga; as veias transversaes *a* e *b* formam um angulo muito obtuso, aberto para a base da asa, da qual *c* se approxima por cerca de 2 vezes o seu comprimento.

Halteres—Brancos, com capitulo preto.

Nota.—A descripção é feita d'um exemplar proveniente da ponte de Ipé-Arcado, na fronteira de Goyas.

ORIGINAL DESCRIPTION OF TÆNIORHYNCHUS PALLIATUS:

Proboscis wholly black scaled, palpi mixed black and yellow, occiput and mesonotum golden-yellow scaled, a large spot on posterior half of mesonotum almost devoid of scales (rubbed?), pleura with several spots of whitish ones. Abdomen black scaled, with a strong tinge of purple, a spot of yellow scales at bases of the third and fourth segments, and of white ones at base of each of the following three segments, a patch of white scales in the outer front angles of each segment; venter black scaled, and with a median stripe of yellow ones on the first four segments. Legs black scaled, those on the under side of each femur yellow; a spot of white

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scales at apex of each femur; base of first joint of each tarsus white scales; tarsal claws simple. Wings hyaline, scales brown, narrow-lanceolate and linear intermixed. Length about 3 mm.

Trinidad, West Indies. A female collected by Mr. F. W. Urich. Type: No. 9140, U. S. National Museum.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES FULVITHORAX:

Female.—Proboscis rather long, slender, uniform; labellæ conically tapered; vestiture black; setæ minute, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth as long as the proboscis; vestiture black, setæ moderate. Antennæ filiform, the joints subequal, rugose, pilose, black; tori subspherical, with a cup-shaped apical excavation, entirely ochraceous, a few black hairs within; second joint thickened at middle, pale at base; hairs of whorls moderate, sparse, black. Clypeus broad, rounded triangular, depressed, luteous brown, nude. Eyes black. Occiput dark brown, clothed very broadly on the vertex with narrow, curved, bright golden yellow scales, broader golden yellow ones on the sides; cheeks bright silvery; many erect forked golden yellow scales on the nape; setæ along margins of eyes black, those projecting between the eyes yellow.

Prothoracic lobes elliptical, remote dorsally, luteous, clothed with narrow, curved, golden-yellow scales and dark brown bristles. Mesonotum luteous, densely clothed with narrow, curved, bright golden scales, intermixed above roots of wings with a few brown ones, a narrow stripe of brown scales on either side of antescutellar space; bristles coarse, yellowish-brown. Scutellum trilobate, clothed with narrow curved golden scales, two submedian patches of broad black scales, and a small one on each lateral lobe, each lobe with a group of about eight brown bristles. Postnotum elliptical, prominent, brownish-luteous, nude. Pleuræ and coxæ yellowish, clothed with patches of flat silvery white scales and rows of dark bristles.

Abdomen subcylindrical, tapering posteriorly, fifth to seventh segments apically expanded beneath; dorsal vestiture blue-black, third and fourth segments with median, basal, golden triangular patches, fifth, sixth and seventh segments with silvery, median, transverse, basal patches; a row of large, lateral, silvery basal spots dorsally produced towards middles of segments; first segment with blue-black scales and many fine pale hairs; venter yellowish-scaled at base, fifth, sixth and seventh segments black-scaled with yellowish basal bands.

Wings moderate, hyaline; stem of second marginal cell much shorter than its cell, that of second posterior cell about equal to its cell; basal cross-vein more than its own length distant from anterior cross-vein; scales brown, costa with a blue-back reflection, the outstanding scales ligulate, denser on forks of second vein. Halteres whitish, the knobs dark and with a fringe of minute white scales.

Legs slender, moderately long; vestiture blue-black; femora pale golden at base and beneath, the anterior pair to apex, the middle and hind pairs nearly to tips; knees of hind and middle pairs broadly silvery; tibiæ blue black, narrowly pale within; first tarsal joint of hind leg white on its basal fifth, a similar smaller white mark on fore and middle tarsi, the remaining joints blue-black. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Male.—Proboscis straight, long and slender, blue black. Palpi very slender, as long as the proboscis, uniform, the terminal joints not enlarged and without long hairs; vestiture entirely blue-black. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, pale, dark at insertions of hair-whorls; hairs of whorls long, dense, black with a pale reflection. Coloration similar to the female. Abdomen elongate, the lateral silvery spots visible dorsally, the black scales at sides and beneath outstanding on last four seg-

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ments; third, fourth, fifth and sixth segments with yellow bristles at apical angles. Wings narrower than in the female, stalks of the fork-cells longer, the vestiture less abundant, the outstanding scales of veins narrowly ovate. Claw formula, 1.0–1.0–0.0.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 33, fig. 222): Side-pieces over twice as long as wide, narrowly conical; apical lobe absent, basal lobe angular, its tip semi-detached as a short column bearing a long coarse seta. Clasp-filament long, slightly swollen in the middle, with a long articulated terminal spine. Harpes narrow, strongly revolute, columnar, tip turned over and pointed. Harpagones absent (unless the organ described as the basal lobe of the side-piece represents them). Unci contiguous, revolute, forming a large basal cylinder. Basal appendages short, bearing four long spines.

Larva, Stage IV (plate 123, fig. 425).—Head rounded, widest through eyes, but more circular than usual; antennæ rather long, slender, uniform, smooth, with a single hair at middle; both pairs of dorsal head-hairs single, ante-antennal tuft small, three-haired. Skin of body smooth. Lateral comb of eighth segment of about sixteen scales in a patch, each scale elongate, rounded, evenly fringed with short spinules. Air-tube stout, about two and a half times as long as wide, tapering outwardly; pecten of about fifteen evenly spaced teeth, not reaching to the middle of the tube, closely followed by a single three-haired tuft. Anal segment about as long as wide, with a dorsal plate reaching well down the sides; dorsal tuft a long hair and tuft of four hairs on each side; ventral brush well developed, confined to the barred area; anal gills very large and thick, bluntly rounded, over twice as long as the segment, the upper pair thicker, more blunt, and a little longer than the lower pair.

The larvæ live in the water in hollow trees. Mr. Urich forwarded specimens found by Dr. J. R. Dickson in such a location.

Forest regions of tropical South America.

Agua Santa, Trinidad, June 24, 1905 (F. W. Urich). Reported also from the States of São Paulo (Lutz), Rio de Janeiro and Bahia (Peryassú), Brazil.

The thoracic ornamentation of the imago is subject to variation, the dorsal vestiture being sometimes entirely golden.

AËDES SEPTEMSTRIATUS Dyar & Knab.

Aëdes septemstriatus Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 10, 1907.
Aëdes septemstriatus Theobald, Mon. Culic., v, 485, 1910.

ORIGINAL DESCRIPTION OF AËDES SEPTEMSTRIATUS:

Proboscis and palpi black; head bronzy yellow behind the eyes, two blue-black spots upon the vertex separated by a golden line; thorax deep brown with seven narrow golden lines and the front margin golden; a median dorsal line, narrow in front, broadened towards the scutellum, a narrow line on each side of it which stops at the basal fourth of the thorax, outside of these are two slightly oblique lines which extend from the base to the middle of the thorax, lateral marginal stripe extends down the sides in the form of large golden patches; pleura silvery. Abdomen blue-black with median white basal spots on some of the segments, the three last segments spotted with silver at the sides; under surface black with white bands. Legs; first pair black, the base of the first tarsal joint silvery; middle legs black, knees silvery, hind legs black, femora tipped with silver, the base of the first tarsal joint silvery. Tarsal claws of the female simple.

3 specimens, Bluefields, Nicaragua (W. F. Thornton).

Type.—Cat. no. 10144, U. S. Nat. Mus.

Differs from any described *Aëdes* with simple claws known to us in the median dorsal thoracic line.

DESCRIPTION OF FEMALE OF AËDES SEPTEMSTRIATUS (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather slender, uniform, labellæ conically tapered; vestiture black; setæ minute, curved, black, those on labellæ more prominently out-

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standing. Palpi short, about one-fifth the length of the proboscis; vestiture black, setæ moderate, outstanding. Antennæ filiform, the joints subequal, pilose, black; second joint slightly thickened, fusiform, pale at base and bearing a few black scales; tori subspherical, with a cup-shaped apical excavation, ochraceous, blackish on inner side; hairs of whorls sparse, black, moderate. Clypeus rounded triangular, convex, pale brown, nude. Eyes black. Occiput pale brown, clothed entirely with broad flat scales except a narrow line of curved lanceolate ones medianly, golden yellow, a large patch of black ones on either side of median line and not reaching the eyes; many erect forked golden yellow scales on the nape; bristles along margins of eyes black, those projecting between the eyes pale brown.

Prothoracic lobes elliptical, remote dorsally, ochraceous, with broad yellowish-silvery scales and brown bristles. Mesonotum clothed with narrow, curved scales, dark bronzy-brown, with lines of golden yellow; a narrow median line, widening and dividing posteriorly to inclose the antescutellar space, a narrow line on either side of it from anterior edge to posterior fourth, a slightly broader line on sides of disk beginning at the middle and running to posterior border, a broader area along lateral margin, slightly incised by the dark color at its middle and disconnected behind to form a small spot at roots of wings; bristles coarse, brown. Scutellum trilobate, clothed with narrow, curved golden-yellow and broad, flat black scales, the black scales on the mid lobe divided by basally and apically broadened patch of golden scales; each lobe with a group of brown bristles. Postnotum elliptical, prominent, luteous, nude. Pleuræ brown, coxæ luteous, clothed with patches of broad silvery-white scales and rows of brown bristles, the anterior angles broadly clothed with narrow, curved golden scales.

Abdomen subcylindrical, tapered posteriorly, fifth to seventh segments expanded posteriorly beneath; dorsal vestiture blue-black, a row of median, basal, broadly triangular silvery spots on segments three to seven, the distal three silvery white, the others golden ochraceous; a row of lateral, basal, segmental, subquadrate silvery-white spots; venter yellowish scaled, the last three segments nearly entirely black-scaled.

Wings moderate, hyaline; petiole of second marginal cell about half as long as its cell, that of second posterior cell somewhat shorter than its cell; basal cross-vein distant about its own length from anterior cross-vein; scales brown, a blue-black reflection on costa, outstanding scales broadly ligulate, narrowly elliptical and denser toward apex of wing. Halteres whitish, with black knobs.

Legs slender, moderately long; vestiture blue-black; femora white at base, the hind pair silvery beneath for three-fourths their length; knees of middle and hind legs silver-scaled; tibiæ blue-black; basal joint of tarsi white-ringed at base, the other joints blue-black. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 3 mm.

Life history and habits unknown.

Nicaragua.

Bluefields (W. F. Thornton).

AËDES SEXLINEATA (Theobald).

Stegomyia sexlineata Theobald, Mon. Culic., i, 308, 1901.
Stegomyia sexlineata Giles, Handb. Gnats or Mosq., 2 ed., 377, 1902.
Stegomyia sexlineata Theobald, Journ. Trop. Med., vi, 238, 1903.
Stegomyia sexlineata Blanchard, Les Moustiques, 260, 1905.
Hæmagogus sexlineata Dyar & Knab, Proc. Biol. Soc. Wash., xix, 166, 1906.
Gymnometopa sexlineata Coquillett, Proc. Ent. Soc. Wash., vii, 183, 1906.
Gymnometopa sexlineata Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 25, 1906.
Gymnometopa sexlineata Theobald, Mon. Culic., iv, 210, 1907.
Gymnometopa sexlineata Theobald, Mon. Culic., v, 219, 1910.

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ORIGINAL DESCRIPTION OF STEGOMYIA SEXLINEATA:

Thorax deep brownish-black, with two median parallel yellow scaled lines and two pairs of lateral pale creamy curved lines on the front of the mesonotum. Abdomen deep brown, with narrow pale creamy basal bands and pure white lateral spots, the last two segments with pure silvery-white basal bands. Legs deep brown; metatarsi and some of the tarsi with basal white bands; knee spot and also a spot on the femora pure white; ungues of ♀ equal and simple.

♀. Head deep brown, covered with flat black scales, with a median and lateral lines of creamy scales and with dull white scales at the sides; the scales of the median creamy line are of rather different form to those of the rest of the head, numerous black bristles projecting forwards and inwards and a few at the sides; projecting forwards in the middle line between the eyes are a few yellowish bristles; on the back of the head are a few small black upright forked scales. Antennae deep black, unbanded, the basal joint with silvery-white flat scales; clypeus black; palpi black scaled, the apices of the last two segments being white scaled above, and there are also a few white scales on their whole upper surface; proboscis rather long and thin, deep black.

Thorax deep brownish-black to almost jet-black, densely covered with narrow curved scales, applied to the surface somewhat closely; those on the major area are deep brownish-black, there are two median nearly parallel creamy-yellow scaled lines, which extend right back to the scutellum and which become almost white before reaching it, then two pairs of lateral curved lines of similar colour which die out about the middle of the mesonotum, the innermost pair being slightly the longer; just beneath and in front of the roots of the wings is a white scaled spot and numerous pale bristles projecting over their roots; scutellum brown, with *small* flat black scales, and a few grey ones on the middle of the mid lobe; posterior border-bristles rather pale, five to the mid lobe; metanotum deep chestnut-brown; pleurae black, with patches of pure white scales.

Abdomen steely black, covered with dusky brownish-black scales; first and second segments unbanded, the third to the sixth with narrow creamy basal bands, the seventh and eighth showing pure silvery-white basal bands, the seventh rather incomplete, all the segments with pure silvery-white lateral spots, which show dorsally on the fifth to seventh segments; these lateral spots are median and their scales rather project ventrally; posterior border-bristles pale golden-brown, longest at the sides of the segments; venter black, the white lateral spots, however, showing very prominently on the venter when the abdomen is empty.

Legs with the coxae dark with some white scales; femora deep brownish-black, white scaled at the base and partly beneath, apex pure white, and there is also a pure white round spot on one side on its apical half; tibiae deep brownish-black with pallid bristles; metatarsi basally white, those of the hind legs but little more than half the length of the hind tibiae; first tarsal joint of the fore and mid legs basally white, remainder black, in the hind legs the first and second tarsi are broadly banded with white at their base (the banding is apparently not always complete), last two tarsi black; ungues equal and simple.

Wings rather dusky brown, the veins clothed with brown scales, the lateral ones long but rather broader than in *Culex;* fork-cells short, the first sub-marginal cell a little longer and narrower than the second posterior cell, their stems about equal and their bases about level; the stems equal to about two-thirds of the length of the cells; sub-costal joins the costal some distance from the bases of the fork-cells and almost level with the supernumerary and mid cross-veins; posterior cross-vein nearly twice its own length distant from the mid cross-vein; fringed brown, rather paler at the base, posterior border scales deep brown, rather long and narrow. Halteres with ochraceous brown stem, fuscous knob with grey scales.

Length.—4 mm.

Time of capture.—December (Urich) (102).

Habitat.—Trinidad, at Agua Santa.

Observations.—Described from a single perfect ♀ in beautiful condition. It forms quite a distinct species, coming near *S. notoscripta*, Skuse, in thoracic ornamentation, but clearly distinct from it in arrangement and also by the absence of the proboscis band and head ornamentation. I have seen no specimens from elsewhere.

DESCRIPTION OF FEMALE OF AËDES SEXLINEATA (MALE AND LARVA UNKNOWN):

Female.—Proboscis long and slender, subcylindrical, uniform; vestiture black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi about one-fifth the length of the proboscis, slightly thickened by scales at the tips; vestiture black, with a patch of silvery-white scales near

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middle, the tips broadly silvery-white. Antennæ filiform, the joints subequal, rugose, pilose, dark brown, second joint slightly thickened, clothed with black scales on inner side; tori subspherical, with a cup-shaped apical excavation, luteous, black and with a group of small, flat silvery-white scales on inner side. Clypeus elliptical, prominent, convex, flattened in middle, dark brown, nude. Eyes black. Occiput clothed almost entirely with flat appressed scales, a few lanceolate ones along median line, bluish-black, a narrow silvery-white median line and a broader lateral one, cheeks silvery-white; bristles along margins of eyes black, those projecting between the eyes pale.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with black scales, a ridge of white scales in the middle, and with many dark bristles. Mesonotum black, clothed with narrow, curved, dark blackish-brown scales and with six narrow, longitudinal, about equidistant lines of pale-yellow scales, running from anterior margin to scutellum; the median pair nearly parallel, converging slightly towards antescutellar space; second pair wavy, curved outwardly on anterior half; outer pair marginal and enclosing a dark spot before roots of wings; bristles coarse, the anterior ones black, those over roots of wings and about antescutellar space pale yellow. Scutellum trilobate, brown; vestiture of broad, flat, blackish-brown scales, the mid lobe with a median line of narrower white scales, each lobe with a group of pale yellow bristles. Postnotum elliptical, prominent, blackish, nude, with a slight pruinosity. Pleuræ and coxæ blackish, clothed with patches of flat, elliptical, silvery-white scales and a small patch of black ones on each coxa; bristles small, pale.

Abdomen subcylindrical, tapering posteriorly, sixth and seventh segments expanded apically beneath; dorsal vestiture of blue-black scales, a band of yellow-white ones at base of each segment, broadest at middle and not attaining the lateral margins, those on last two segments silvery; a series of large, triangular, silvery-white lateral patches, showing in a dorsal view on posterior segments, their hind margins transverse and one point reaching base of segment; venter black-scaled, the segments with broad basal bands of yellowish or silvery-white scales; bristles coarse. Cerci not prominent.

Wings moderate, hyaline; petiole of second marginal cell about one-third as long as its cell, that of second posterior cell only a little shorter than its cell; basal cross-vein more than its own length from anterior cross-vein; scales deep brown, those on costa black with a bluish reflection, the outstanding ones ligulate, with rounded tips, those on second vein dense and much broader. Halteres whitish, with dark knobs.

Legs slender, moderately long; vestiture black, marked with white; femora with a narrow yellowish line beneath which terminates in a silvery-white lateral spot at outer third, tips of anterior pair narrowly, of middle and posterior pairs broadly silvery-white; front and middle tibiæ with a narrow yellowish line on outer side, on inner side in hind pair, bases broadly white beneath; hind tarsi with a white ring at base of each joint except the last two, which are entirely dark, the ring on the third joint broadest, extending to apical third; front and mid tarsi with first two joints broadly ringed at base. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Life history and habits unknown.

Island of Trinidad, West Indies.

Agua Santa, July 10, 1899 (F. W. Urich); Trinidad, June, 1905 (A. Busck).

AËDES WALKERI (Theobald) Dyar & Knab.

Culex (Stegomyia?) walkeri **Theobald, Mon. Culic., i, 424, 1901.**
Howardina walkeri **Theobald, Mon. Culic., iii, 287, 1903.**
Howardina walkeri **Dyar, Journ. N. Y. Ent. Soc., xiii, 27, 1905.**
Culex walkeri **Blanchard, Les Moustiques, 312, 1905.**

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Howardina walkeri Blanchard, Les Moustiques, 416, 1905.
Howardina walkeri Theobald & Grabham, Mosq. or Culic. of Jamaica, 20, 1905.
Aëdes walkeri Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 192, 1906.
Howardina walkeri Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 26, 1906.
Hæmagogus walkeri Dyar & Knab, Proc. Biol. Soc. Wash., xix, 166, 1906.
Howardina walkeri Theobald, Mon. Culic., iv, 215, 1907.
Howardina walkeri Theobald, Mon. Culic., v, 220, 1910.

ORIGINAL DESCRIPTION OF CULEX (STEGOMYIA?) WALKERI:

Thorax chestnut-brown, with a broad greyish-white scaled area on each side of the mesonotum. Fore and mid legs apparently unbanded, pale at the base of the femora; base of the metatarsi and first two tarsal joints of the hind legs banded with white. Abdomen brown, showing traces of white basal banding.

Length.—4 mm.

Habitat.—Jamaica.

Observations.—The above is a note I made on a specimen in the old collection at the British Museum, labelled *C. fasciatus*, F. It is certainly not *fasciatus*, and is quite distinct from any known species. Nothing approaching it has been received from the West Indies. It is in poor condition, and is probably a *Stegomyia;* the marked thoracic ornamentation should at once render its identity easy. If a true *Culex* its position in the table would be after *C. Japonicus*, mihi. The head and scutellum are too damaged to say definitely to which genus it belongs, so it is placed provisionally in *Culex*.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES WALKERI:

Female.—Proboscis rather long, subcylindrical, uniform; vestiture black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi about one-fifth the length of the proboscis, slightly thickened with scales at the tip; vestiture black, tips silvery-white. Antennæ filiform, the joints subequal, rugose, black, with long pilosity; second joint slightly thickened towards apex, pale at base; tori subspherical, with a cup-shaped apical excavation, ochraceous; hairs of whorls sparse, rather long, brown. Clypeus elliptical, prominent, dark brown, nude. Eyes black. Occiput clothed with flat appressed scales, a rather narrow area of narrow curved ones along median line, black, a rather broad, silvery-white median stripe continued forward between eyes, a broad lateral yellowish-white area extending to cheeks and inclosing a small, black, lateral spot on ocular margin; some upright forked pale scales well back on the nape; bristles along margins of eyes black, none projecting forward between eyes.

Prothoracic lobes elliptical, remote dorsally, brown on upper angle, densely clothed with large, broad silvery-white scales and with dark bristles. Mesonotum deep brown, clothed with narrow, curved scales, dark blackish-brown on the disk, two narrow, longitudinal golden-yellow lines, discontinued before antescutellar space and followed from that point by a single broader silvery line across antescutellar space, a narrow golden line on each side of antescutellar space running forward to middle of disk, sides of mesonotum broadly silvery-white scaled, broadest on anterior third; bristles over roots of wings pale golden. Scutellum trilobate, pale brown, clothed with blackish-brown scales, middle lobe with a narrow central silvery-white line continuous with that on mesonotum, each lobe with a group of pale golden bristles. Postnotum elliptical, prominent, nude, brown, with a slight pruinosity. Pleuræ and coxæ luteous, clothed with patches of flat elliptical silvery-white scales; bristles small, pale.

Abdomen subcylindrical, tapering posteriorly, sixth and seventh segments somewhat expanded apically beneath; dorsal vestiture of greenish-black scales, with rather broad bands of dull yellow scales at bases of segments, broadest medianly, laterally abbreviated on second and third segments, on succeeding segments touching the lateral spots, last two segments with silvery basal bands; a series of large, lateral, segmental, triangular silvery-white patches, showing in a dorsal view on the posterior segments; first segment black scaled, with many

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fine pale hairs; venter silvery-white scaled, the posterior segments banded with black at the apices.

Wings moderate, hyaline; petiole of second marginal cell about half as long as its cell, that of second posterior cell a little longer than its cell; basal cross-vein more than its own length from anterior cross-vein; scales dark brown, the outstanding ones narrowly ligulate. Halteres whitish, with dark knobs.

Legs slender, moderately long; vestiture black, marked with silvery-white; femora broadly white beneath except towards tip on fore and mid legs; knees narrowly silvery-white; tibiæ entirely black; hind tarsi with a broad white ring at bases of first three joints, the last two entirely dark; fore and middle tarsi with only the first joint narrowly white at base. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 2.8 mm.

Male.—Proboscis long and slender, nearly straight, black scaled. Palpi as long as the proboscis, slender, the terminal joints not enlarged and with a few long bristles only; vestiture bronzy-black, the last two joints with a patch of silvery-white scales basally beneath. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, pale, ringed with black at insertions of hair-whorls; hairs long, dense, brownish black. Coloration similar to the female. Abdomen elongate, depressed, the lateral ciliation coarse, short and rather sparse. Wings nearly as broad as in the female, the scales less abundant. Claw formula, 2.1–2.1–0.0.

Length: Body about 3.5 mm.; wing 2.5 mm.

Genitalia (plate 33, fig. 223): Side-pieces about twice as long as wide, tips conically tapered; apical lobe absent, basal lobe broadly conical, bearing a single stout terminal seta. Clasp-filament moderate, slightly enlarged at base, with a long articulated terminal spine. Harpes elliptical, inner margins and the tip broadly thickened and revolute, narrow at end and bent over, a few small setæ on outer aspect. Harpagones wanting. Unci approximate, revolute, forming a stout basal cylinder. Basal appendages absent, represented by a group of four stout setæ on either side.

Larva, Stage IV (plate 125, fig. 433).—Head rounded, slightly wider than long, narrowed at insertion of antennæ. Antennæ cylindrical, rather slender, very slightly tapered, sparsely spined all over; a single hair a little beyond the middle; three moderate and one long terminal spine and a digit on a pedestal. Eyes moderate, transverse. Upper pair of dorsal head-hairs single and long, lower pair shorter, of four hairs; ante-antennal tuft multiple. Mental plate triangular, large, a central sharp tooth and eleven on each side, alike, closely set, their tips inclined inward. Mandible quadrangular, a group of small spines without; two stout filaments near tip, each with a spine at base; an outer row of coarse cilia from a well-defined collar; another row on outer margin; dentition of one large and three small teeth on a narrow process; two small filaments above, a serrate filament and four plumose ones within; process below furcate, with a row of hairs above and a tuft at tip of each limb; five stout hairs within; five long hairs at base. Maxilla nearly hemispherical, bisected by a band-shaped suture; inner half densely haired; a brush of hairs at tip, two long processes near the suture and a spine on the other side; palpus narrowly joined to body of maxilla, about four times as long as wide, with small spines before the tip and four terminal digits, two of which are on an elevated base. Thorax rounded, wider than long; hairs moderate. Abdomen moderate, the anterior segments shorter; lateral hairs of first two segments in tufts of three, double on third to fifth, single on sixth; short hairs in large stellate tufts on both thorax and abdomen. Thorax smooth, abdomen densely and coarsely pubescent. Air-tube moderately stout, about two and a half times as long as wide, slightly tapered;

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pecten extending nearly to tip, of very long teeth on basal half, shorter and slightly more sparse beyond; a slender hair-tuft a little beyond middle of tube; single pecten-tooth a long simple tapered spine. Lateral comb of eighth segment a series of long, stout, bar-like scales in a straight row; single scale a long tapering shaft, six times as long as wide, fringed with short spinules. Anal segment about as long as wide, with a dorsal plate reaching well towards ventral line, densely pilose, and with a row of long spines on posterior margin, a multiple tuft at posterior angle; dorsal tuft a long hair and a tuft of very long hairs on each side; ventral brush very large, inserted in a rhomboidal chitinous plate, which it pierces in a double row of alternating holes; anal gills long, regularly tapered.

The larvæ live in the water between the leaves of Bromeliaceæ. Dr. Grabham found them in *Tillandsia utriculata* Linnæus and *Caraguata lingulata* (L.) Lindley. He says that the larvæ are very timid, hurrying to the bottom on the slightest provocation. Confined in a bottle they avoided light and stayed on the dark side. The length of the pupa stage is nearly four days. In the larva the pecten of the breathing-tube shows considerable variation; in some specimens the pecten-teeth are nearly evenly spaced to the end, in others the last third of the pecten consists of a few well separated teeth.

Island of Jamaica, West Indies.

Mavis Bank, 5000 feet (M. Grabham).

It would seem as if *Aëdes walkeri* should have representatives on other islands of the Greater Antilles, but such have not come to hand. More careful collecting may, however, reveal them, as very little has been done towards investigating the mosquito fauna of the Bromeliaceæ in those islands.

AËDES QUADRIVITTATUS (Coquillett) Dyar & Knab.

Culex quadrivittatus Coquillett, Can. Ent., xxxiv, 293, 1902.
Culex quadrivittatus Blanchard, Les Moustiques, 628, 1905.
Ochlerotatus quadrivittatus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 20, 1906.
Aëdes quadrivittatus Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 11, 1907.
Culex quadrivittatus Theobald, Mon. Culic., v, 395, 1910.
Aëdes quadrivittatus Theobald, Mon. Culic., v, 486, 1910.
Aëdes quadrivittatus Picado, Bull. Scient. France, Belg., 7 sér., xlvii, 353, 1913.

ORIGINAL DESCRIPTION OF CULEX QUADRIVITTATUS:

♀. Differs from *atropalpus* as follows: Scales at apices of palpi and several on the upper side white, scales of occiput yellowish and with four patches of black ones; scales of mesonotum black with four vittæ, and lateral margin of golden yellow ones; abdomen black scales, each segment with a lateral patch of white ones extending nearly to the middle of the venter; scales of legs at apices of tibiæ and of joints of tarsi black, on the last two joints of the hind tarsi wholly black, tarsal claws simple.

Length, 4.5 mm. Eight females received, June 13, by Dr. L. O. Howard from Prof. Gustav Eisen, of San Francisco, Cal. Type: No. 6560, U. S. N. M.

Habitat.—Chacula, Guatemala (6,600 feet altitude).

DESCRIPTION OF FEMALE OF AËDES QUADRIVITTATUS (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather long, subcylindrical, uniform; vestiture black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi about one-fifth the length of the proboscis; vestiture black, tip narrowly silvery-white. Antennæ filiform, the joints subequal, rugose, coarsely pilose, dark brown; second joint swollen; tori subspherical, with a cup-shaped apical excavation, luteous, brown and with a group of small pale-yellow scales on inner side. Clypeus elliptical, prominent, dark brown, nude. Eyes black. Occiput clothed entirely with broad, flat appressed scales, those along middle line but slightly narrowed, brownish-black, a broad, pale golden-yellow median line, a

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still broader lateral one joined behind to the whitish vestiture on lower part of sides; a row of yellowish erect forked scales on the nape; bristles along margins of eyes coarse, brown, those projecting forward on vertex golden-yellow.

Prothoracic lobes elliptical, remote dorsally, clothed with broad flat white scales below, golden-yellow lanceolate ones above. Mesonotum black, clothed with narrow, curved brownish-black scales and with four narrow, longitudinal, nearly parallel lines of golden-yellow scales running from anterior margin to scutellum, the median pair slightly more approximated towards middle and behind inclosing antescutellar space, second pair broadening gradually on anterior half and involving anterior angles, a large marginal patch of golden-yellow scales before wing insertions; bristles over roots of wings pale yellow. Scutellum trilobate, each lobe with a small group of yellowish bristles; vestiture brownish-black, a patch of golden-yellow scales on mid lobe. Postnotum elliptical, prominent, blackish, nude, with a slight pruinosity. Pleuræ dark brown, coxæ luteous, clothed with patches of flat, elliptical yellowish-white scales; bristles small, pale.

Abdomen subcylindrical, tapering posteriorly, sixth and seventh segments apically expanded beneath; dorsal vestiture velvet-black, a median series of small, basal, segmental yellowish spots on second to fifth segments, a series of large, subquadrate lateral silvery-white patches, showing in dorsal view on fourth to eighth segments; first segment black scaled and with many fine pale hairs; venter black, segments with V-shaped yellowish-white basal bands.

Wings moderate, hyaline; petiole of second marginal cell about half as long as its cell, that of second posterior cell only a little shorter than its cell; basal cross-vein more than its own length from anterior cross-vein; scales dull brown, costa with blue luster, the outstanding ones long, broadly linear, denser towards apex of wing, particularly on second vein. Halteres whitish, with dark knobs.

Legs long and slender; vestiture black, marked with white; femora pale at base and white beneath except towards tips, the anterior pair to tips; knees narrowly silvery-white; tibiæ black, narrowly white at base beneath; hind tarsi with moderately broad white rings at bases of first three joints, mid and fore tarsi with a white ring on first two joints only. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 4 mm.

The larvæ live in the water between the leaves of bromeliaceous plants; imagos have been bred from larvæ found in epiphytic bromeliads by C. Picado. The species appears to be restricted to the elevated portions of Central America.

Guatemala and southward to Costa Rica.

Chaculá, Guatemala, 6600 feet, June 13, 1902 (G. Eisen); La Pitahaya, near Cartago, Costa Rica, 1400 meters, November (C. Picado).

AËDES ALBONOTATA (Coquillett) Dyar & Knab.

Gymnometopa albonotata Coquillett, Proc. Ent. Soc. Wash., vii, 183, 1906.
Aëdes albonotata Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 196, 1906.
Aëdes albonotata Dyar, Proc. Ent. Soc. Wash., viii, 15, 1906.
Hæmagogus albonotata Dyar & Knab, Proc. Biol. Soc. Wash., xix, 166, 1906.
Gymnometopa albonotata Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 25, 1906.
Gymnometopa albonotata Theobald, Mon. Culic., iv, 211, 1907.
Gymnometopa albonotata Theobald, Mon. Culic., v, 219, 1910.

ORIGINAL DESCRIPTION OF GYMNOMETOPA ALBONOTATA:

Like *buscki*, the only apparent differences being the presence of a silvery dot in middle of front margin of the mesonotum, and a distinct white band at base of first two joints of the front and middle tarsi and of each joint in the palpi of the male; the broad apices of the palpi of the female are white-scaled.

San Francisco Mts., Santo Domingo, West Indies. Five males and three females collected by Mr. A. Busck.

Type.—No. 8297, U. S. National Museum.

Dr. Dyar informs me that the larva is readily separable from that of *buscki*.

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DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES ALBONOTATA:

Female.—Proboscis rather long and slender, subcylindrical, uniform; vestiture black; setæ minute curved, black, those on labellæ more prominently outstanding. Palpi about one-fifth the length of the proboscis; vestiture black, tips narrowly silvery-white. Antennæ filiform, the joints subequal, rugose, coarsely pilose, brown; second joint slightly swollen towards apex; tori subspherical, with a cup-shaped apical excavation, luteous, brown within; hairs of whorls moderate, brown. Clypeus elliptical, prominent, dark brown, nude. Eyes black. Occiput clothed entirely with flat appressed scales, those along middle line narrower and longer, brownish-black, a rather broad, silvery-white median line extending forward between eyes and apically produced into a tuft of long scales projecting between tori; sides and cheeks white, inclosing a large black spot near ocular margin; many erect, forked brownish-black scales well back on the nape; bristles along margins of eyes black, none projecting between eyes.

Prothoracic lobes elliptical, remote dorsally, luteous, brown on upper angle, clothed with broad silvery-white scales in the middle and with dark bristles. Mesonotum brown, clothed with narrow, curved, very dark bronzy-brown scales and with four longitudinal, evenly spaced, narrow lines on the disk, the median pair of golden and silver scales intermixed and extending from anterior margin to antescutellar space, followed by a median silvery line across antescutellar space, a narrow golden line at either side of antescutellar space extending forward to middle of disk, a narrow lateral margin of broadly elliptical silvery-white scales from base of wing to anterior angles, a small median white patch on anterior margin; bristles over roots of wings deep brown. Scutellum trilobate, brown, clothed with broad brownish-black scales, middle lobe with a central line of silvery-white scales, each lobe with a group of deep brown bristles. Postnotum elliptical, prominent, brown, nude, with a slight pruinosity. Pleuræ brownish, coxæ luteous, clothed with patches of flat elliptical silvery-white scales; bristles small, pale.

Abdomen subcylindrical, abruptly tapering posteriorly, sixth and seventh segments apically expanded beneath; dorsal vestiture of dull blue-black scales, an indistinct, dull yellow, median spot at bases of third, fourth and fifth segments; a series of large, lateral, segmental, basal, subquadrate silvery-white patches, produced and showing in dorsal view on seventh and eighth segments; first segment black scaled, with many fine pale hairs; venter yellowish silvery-white scaled, with apical black segmental bands.

Wings moderate, hyaline; petiole of second marginal cell about one-third as long as its cell, that of second posterior cell only a little shorter than its cell; basal cross-vein more than its own length from anterior cross-vein; scales dull brown, costa with a blue reflection, the outstanding scales broadly linear, denser and broader on second vein. Halteres whitish, with dark knobs.

Legs slender, rather long; vestiture black, marked with white; femora pale at base and beneath on basal half; knees silvery-white, broadly on hind legs; tibiæ entirely blue-black, front pair with a silvery spot dorsally at apex; tarsi of hind legs with a broad white ring at bases of first three joints, that of third joint very broad, involving three-fourths of joint; middle tarsi with white rings at bases of first two joints; fore tarsi with a white ring at base of second joint.

Length: Body about 3.5 mm.; wing 3 mm.

Male.—Proboscis straight, rather long and slender, black scaled. Palpi as long as the proboscis, slender, the terminal joints not enlarged and with a few long bristles only; vestiture black, a white ring at middle of long joint and at bases of last two joints. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, pale, ringed with black at insertions of

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hair-whorls; hairs of whorls long, black, not as dense as usual in males. Coloration similar to the female. Abdomen elongate, dorsally depressed, lateral ciliation of sparse irregular black hairs. Wings about as broad as in the female, the scales less abundant. Claw formula, 2.0–2.0–0.0.

Length: Body about 3.5 mm.; wing 2.5 mm.

Genitalia (plate 33, fig. 219): Side-pieces about twice as long as wide, tips conically tapered; apical lobe absent, basal lobe broadly conical, bearing a single stout terminal seta. Clasp-filament long, slender, slightly enlarged at base, with a long articulated terminal spine. Harpes elliptical, inner margins and tip broadly thickened and revolute, end bent over. Harpagones wanting. Unci approximate, revolute, forming a stout basal cylinder. Basal appendages absent, represented by a group of several stout setæ on either side.

Larva, Stage IV (plate 124, fig. 430).—Head rounded, widest through eyes, a slight notch at insertion of antennæ, front margin broadly arcuate. Antennæ slender, moderate, uniform, a single hair near middle; three short spines and a digit at tip. Upper pair of dorsal head-hairs single, lower pair double, anteantennal hairs double. Mental plate broadly triangular, with a central tooth and twelve on each side, the last small. Mandible quadrangular, slightly spined at base; a filament and three short ones before tip; an outer row of cilia from a collar; a dense row of long filaments on outer margin, the two basal ones feathered; dentition of four teeth on a process, the first longest; a spine before, a trifid tooth at base, a broad smooth filament and row of long feathered hairs within; process below furcate, with a longitudinal median row of hairs and a tuft at tip of each limb; basal angle small, with a row of hairs within and a row at base. Maxilla elongate conical, divided by a suture; inner half with a rounded enlargement at base bearing two filaments at its tip and a row of spinose hairs without, a row of cilia above on margin and a dense band within, a row of coarse serrate hairs at tip; outer half with two filaments near apex, a spine on other side and a few hairs below; palpus long and slender, two-thirds as long as the maxilla, with four small apical digits. Thorax rounded, wider than long. Abdomen moderate, anterior segments shorter; lateral hairs in threes on first segment, in twos on second to sixth; secondary hairs in stellate tufts. Air-tube very stout, tapered on outer half, about twice as long as wide; pecten running beyond the middle, of few short stout spines, a small tuft just within the last tooth; single pecten-tooth a long spine with a small basal branch. Lateral comb of eighth segment of about fifteen scales in a single row; single scale elongate, rounded at tip, fringed with spinules. Anal segment as long as wide, with a dorsal plate reaching over halfway down the sides, fringed with long spines on posterior margin; dorsal tuft a long hair and group of three shorter ones on each side; a lateral tuft of three long hairs at posterior angles of plate; ventral brush long but sparse, with a small triangular chitinous plate on each side of barred area; anal gills about twice as long as the segment, broad and sack-like, bluntly rounded at tips.

The larvæ live in the water in bamboo-stumps and in tree-holes. Mr. Busck found them in the former, Dr. Dyar in a hole in the trunk of a Royal Ponciana filled by rain-water.

Island of Santo Domingo and the Bahamas.

San Francisco Mountains, Santo Domingo, September 3, 1905 (A. Busck); Nassau, New Providence, Bahamas, March 1, 1915 (H. G. Dyar).

AËDES AUREOSTRIATA (Grabham).

Howardina aureostriata **Grabham, Can. Ent., xxxviii, 171, 1906.**
Hæmagogus aureostriata **Dyar & Knab, Proc. Biol. Soc. Wash., xix, 167, 1906.**
Howardina inequalis **Grabham, Can. Ent., xxxix, 25, 1907.**
Howardina aureostriata **Theobald, Mon. Culic., v, 609, 1910.**
Howardina inæqualis **Theobald, Mon. Culic., v, 611, 1910.**

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ORIGINAL DESCRIPTION OF HOWARDINA AUBROSTRIATA:

♀. Proboscis black, slightly curved downwards, rather long and narrow, three-quarters length of abdomen. Palpi black, extremity of terminal joint golden-scaled, a few golden scales on the upper median surface of the penultimate joint; under surface of palpi specked with gold scales. Antennae black, scattered gold scales throughout its length, especially on the lower joints; about three-quarters length of proboscis. Clypeus black. A narrow median band of golden scales on the centre of the occiput, two broad bands of golden scales on each side of the occiput, the intervening spaces black-scaled; a number of upright forked scales on the nape; scales on the extreme sides of the head silvery. Thorax black-scaled, with seven rows of brilliant narrow curved golden scales, the outermost pair starting from the wing insertions, curving round and bordering the mesonotum laterally and anteriorly; the next pair arise from the preceding near the anterior border of the mesonotum, and run backward, terminating in the lateral lobes of the scutellum; the innermost pair also originate anteriorly, and course backwards, gradually narrowing, over three-quarters the length of the mesonotum. The seventh row arises in the hinder third of the mesonotum, and terminates on the posterior margin of the mid lobe of the scutellum. Prothorax with brilliant silvery scales. Patches of silvery scales on the pleura. Scutellum with a median and two lateral bands of golden scales. Three long hairs on each of the lateral lobes and four on the central lobe. Wings with pale brown scales, the lateral ones long and narrow, median ones short and obconical. First submarginal cell narrower and one-third of its length longer than the second posterior cell, its stem less than half the length of the cell; stem of the second posterior as long as the cell; posterior cross vein more than its own length behind the mid cross vein. Halteres with white stems and brown knobs. Abdomen black-scaled, with violet reflections; first four segments with basal bands of golden scales; all segments apically bordered with long white hairs. Triangular patches of silvery scales on the sides of the segments extending ventrally a short distance. Venter with broad basal bands of golden scales on all the segments except the last two. Legs black, with violet reflections, speckled with golden scales, especially towards the extremities; femora golden-scaled on the under surface throughout their whole length, upper surface golden-scaled near the base, a few silvery scales at the apices above forming three spots, especially on the mid and hind legs. Tibiae unbanded in all the legs. A narrow white basal band on the mid metatarsus. Broad basal bands of silvery-white scales on the metatarsus and first two tarsi of the hind legs. Ungues equal and simple.

Length 2.5 mm.

♂.—Palpi black, very long and narrow, extending about one-quarter of their length beyond proboscis; three long black hairs at the extremities of the terminal joints; a few on the sides of the penultimate and at the extreme apices of the antepenultimate joints; a few golden scales at the junction of the terminal and penultimate joints; a conspicuous band of golden scales at the lower third of the antepenultimate joint. Shaft of the antennae conspicuously golden-scaled. The median band of gold scales on the occiput is divided into two by a line of black scales. Abdomen black, segments with long white hairs along the apical borders; all segments with silvery lateral areas; in the last three segments these nearly meet dorsally, forming basal bands. Venter with broad basal bands of silvery scales, among which are a few golden scales along the mid line. Ungues, of the fore leg, unequal, larger biserrated, smaller uniserrated; of the mid leg larger biserrated, smaller uniserrate; of the hind leg simple and equal.

Length, 2.5 mm.

Description of the adult LARVA.—Seen in the breeding jar, it has an almost transparent outline; the head and siphon of a dull red colour. When disturbed it displayed marked activity, retreating with great speed to the dark side of the bottle, and hiding among the algae. Head nearly circular, dull red in colour; antennae transparent, slightly curved inwards, gradually tapering to a blunt apex; Lateral hair tuft reduced to a single simple stout hair, one-quarter the length of antenna, arising about half way up the shaft. Apex with four very short spines and a lamella; surface of shaft entirely devoid of spines. A pair of stout simple hairs on clypeus. Mentum a wide angle of 20 rounded teeth. Several tufted hairs on the upper surface of the head near the bases of the antennae. Thorax and abdomen with scattered tufted hairs, rays 5–20 elongated, jagged at the eyes, some obsoletely feathered; lateral hairs feathered. Comb of twelve stout straight spines in a single row. Air tube sub-cylindrical, about five times as long as broad (at the base), not swollen, tapering gradually towards the summit. Pecten of two rows of simple elongated spines, 24 in number, extending half way up the tube with a compound 2–3-fid hair situated at the upper extremity of each, about the middle of the

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tube. Chitinous plate of ninth segment narrow, saddle-shaped, widely open below, with long spines along its posterior border, a large simple hair at the posterior inferior border (corresponding to the digitate hair in *H. Walkeri*). Ventral group of hairs springing from a diamond-shaped plate. Dorsal group of two pairs, one compound, with short branches, the other pair simple and of great length. Anal papillae narrowly conical, one-third the length of the longest dorsal hairs. Pupa, siphons long and narrow. Terminal appendages ovate, nearly equally divided by mid rib.

OBSERVATIONS.—The first specimen of this fine species was sent by Colonel Loscombe in September, 1905. Recently three larvae were found among a number of *H. Walkeri* larvae collected by Miss Maclaverty from Bromelias, and sent to me alive. They were isolated and developed into adult insects. The pupa stage in both this species and *H. Walkeri* is unusually long—4 days. The chief points of difference between the two species are to be found in the characters of the frontal hairs, hair tufts and siphons. The chitinous covering of the thorax and abdomen of *H. aureostriata* is entirely devoid of the spicules so conspicuous in *H. Walkeri*, which give the latter its dark appearance.

ORIGINAL DESCRIPTION OF HOWARDINA INEQUALIS:

Near *H. aureostriata*, Gbm. (CAN. ENT., May, 1906), but with somewhat broader thoracic lines. The face hairs of the larva are as follows: Anteantennal hair 5- to 8-rayed, upper epistomal hair double, lower about 10-rayed. The compound hair of the dorsal group in the terminal segment is about 6-rayed. In *H. aureostriata* the upper epistomal hair is usually single, and the compound hair of the dorsal group on the terminal segment is 10–12-rayed. The most notable differences are to be observed in the anal gills, those of *H. inequalis* being broadly lanceolate and pigmented, the lower pair only one-half the length of the upper pair, which are one-third the length of the longest hairs of the ventral hair group, while in *H. aureostriata* they are nearly equal in size, narrow, slender and transparent, and about as long as the hairs of the ventral tuft. The larvae collected from hollow trees (chiefly *Anona palustris*, L.) by the seashore, Kingston, have long, slender, pale red bodies, covered with rayed hairs; a pair of large air vessels in the thorax are seen as two conspicuous silvery spots. The females are troublesome blood-suckers in the woods. Length of adult, 2.5 mm.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES AUREOSTRIATA:

Female.—Proboscis moderate, rather slender, subcylindrical, uniform; labellæ conically tapered; vestiture black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi very small, one-sixth the length of the proboscis; vestiture black, setæ rather long. Antennæ filiform, the joints subequal, rugose, coarsely pilose, blackish; second joint slightly swollen towards apex, pale yellow at base; tori subspherical, with a cup-shaped apical excavation, luteous, brownish within; hairs of whorls sparse, rather long, black. Clypeus elliptical, prominent, blackish-brown, nude. Eyes black. Occiput clothed with broad scales, a median stripe of narrower curved ones, black, a golden-yellow median line, sides and cheeks yellowish silvery-white scaled and inclosing a large black patch near ocular margin; bristles along margins of eyes coarse, black, those projecting on vertex pale golden.

Prothoracic lobes elliptical, remote dorsally, brown, with a patch of broad silvery-white scales in the middle and some black setæ. Mesonotum pale brown, clothed with narrow, curved, dark bronzy-brown scales, six narrow subparallel lines of golden-yellow scales, the outer pair marginal, the median pair converging slightly and extending from anterior margin to near antescutellar space, followed by a single line extending over antescutellar space, a line on either side of antescutellar space continued forward to beyond middle of disk, marginal lines extending from roots of wings nearly to apex; bristles over roots of wings sparse, rather long, black. Scutellum trilobate, brown, clothed with flat deep brown scales, middle lobe with a central line of golden-yellow scales, each lobe with a group of black bristles. Postnotum elliptical, dark brown, nude. Pleurae brownish, coxæ luteous, with patches of broad flat white scales and rows of pale bristles.

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Abdomen subcylindrical, rather bluntly terminated posteriorly, fifth, sixth and seventh segments apically expanded beneath; dorsal vestiture of dull blue-black scales, an indistinct, yellowish median spot at bases of segments three to six, a series of very large, lateral silvery-white patches at bases of segments, elongated and showing in a dorsal view on fifth, sixth and seventh segments, united into a band on eighth segment; first segment black scaled and with many fine pale hairs; venter yellowish scaled, the apices of segments with broad, apical black bands, eighth segment entirely black-scaled.

Wings moderate, hyaline; petiole of second marginal cell less than half as long as its cell, that of second posterior cell about as long as its cell, basal cross-vein distant about its own length from anterior cross-vein; scales brown, those on costa with a blue reflection, the outstanding ones linear, broader and denser on second vein. Halteres whitish, knobs dark at their bases.

Legs slender, moderately long; vestiture black; femora whitish at base and narrowly beneath to tips on middle and hind pairs, nearly to apices on front pair; knees silvery-white scaled, broadly on hind pair; fore tibiæ with a silvery spot dorsally at apex; hind tarsi with the first three joints broadly white ringed at base; mid tarsi with the first two joints narrowly white ringed; front tarsi entirely black. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Male.—Proboscis straight, rather long and slender, brownish-black scaled. Palpi longer than the proboscis, very slender, uniform, terminal joints with a few stiff setæ; vestiture brownish black, a pale ring before middle of long joint. Antennæ plumose, the last two joints long, slender, rugose, pilose, black, the others short, luteous, ringed with black at insertions of hair-whorls; hairs of whorls long, dense, brownish-black. Coloration similar to the female. Abdomen elongate, somewhat expanded to sixth segment; seventh and eighth segments dorsally with silvery basal bands; lateral ciliation coarse, rather sparse, yellowish. Wings scarcely narrower than in the female, the vestiture less abundant. Claw formula, 2.1–2.1–0.0.

Length: Body about 3.5 mm.; wing 2.5 mm.

Genitalia (plate 32, fig. 218): Side-pieces about twice as long as wide, tips rounded; apical lobe absent, basal lobe semi-detached, slender, conical, bearing a stout articulated spine at tip. Clasp-filament slender, long, with a long articulated terminal spine. Harpes broadly ligulate, margins revolute, tips recurved and cleft. Harpagones wanting. Unci contiguous, revolute, forming a large basal cylinder. Basal appendages represented by three spines on either side.

Larva, Stage IV (plate 125, fig. 434).—Head rounded, slightly narrowed before eyes, a slight notch at insertion of antennæ, front margin arcuate; antennæ slender, rather long, smooth, a single hair at middle, four unequal spines and an articulated digit at tip; upper pair of dorsal head-hairs double and rather long, lower a pair of ample tufts, ante-antennal tufts of five hairs. Thorax subquadrate, the lateral hairs coarse, moderately long and abundant. Abdomen rather long, the lateral hairs in threes on first segment, double on second to sixth segments; secondary hairs of coarse stellate tufts both dorsally and ventrally. Comb of eighth segment of a long regular row of closely placed, long, spine-like scales. Air-tube slender, about five times as long as wide; pecten of long, evenly spaced teeth running to near middle of tube and followed by a single tuft of two hairs. Anal segment longer than wide; dorsal plate quadrate, reaching over half-way down the sides, two groups of long spines projecting from near posterior margin; a single lateral hair at posterior angles of plate; dorsal tufts a long hair and tuft of long hairs on each side; ventral brush well developed, the tufts long but rather sparse; anal gills short.

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The larvæ live in the water held by the leaf-bases of Bromeliaceæ and holes in trees.

Island of Jamaica, West Indies.

Mavis Bank, April, 1906 (M. Grabham).

Dr. Grabham separated *Aëdes aureostriata* into two species on account of the inequality of the upper and lower pairs of anal gills in one form of the larva. We have carefully examined the specimens sent us by Dr. Grabham, and notice that the difference is one of length only. The gills are as unequal in those with short gills as in those with long ones, although much more noticeable, naturally, in the latter. We can not discover any other differences in the larvæ, nor any in the adults, and are forced to consider both forms as one species. The length of the gills is variable, particularly with the character of the breeding-place, and therefore not a specific character except in cases of high specialization.

AËDES AURITES (Theobald).

Howardina aurites Theobald, Mon. Culic., iv, 216, 1907.
Howardina aurites Theobald, Mon. Culic., v, 220, 1910.

ORIGINAL DESCRIPTION OF HOWARDINA AURITES:

Head with golden scales in the middle and creamy ones laterally, with two median dark areas and two smaller lateral dark ones.

Thorax deep black with two median golden lines which unite to form one line behind, and another golden line on each side running from the front to back of mesonotum; and a small golden-scaled area on each side.

Abdomen black with basal white spots and a few white basal scales.

Legs deep brown, fore and mid unbanded, hind legs with basal white bands to first and second tarsals only.

♀. Head deep brown with a median area of golden narrow-curved scales, then flat black ones forming a lateral line on each side, then flat golden scales shading into creamy-yellow with a small area of dark scales on each side bordering the eyes, a few small dark upright forked scales; proboscis deep brown, unbanded; palpi deep brown, a few creamy apical scales; antennæ deep brown, basal segment deep brown, pale inside.

Thorax deep blackish with two parallel thin golden scaled lines in the middle uniting behind into one line, which widens out over the bare space in front of the scutellum; a thin golden line on each side running the whole length of the mesonotum ending at the scutellum, and a small golden-scaled area on each side of the mesothorax, the dark intervening spaces are scantily clothed with narrow-curved deep bronzy-brown scales; scutellum with narrow-curved golden scales in the centre of the mid lobe, small flat black ones at the sides, the lateral lobes with narrow-curved golden scales, mid lobe with three large posterior border-bristles; metathorax deep brown; pleurae brown with one large silvery spot.

Abdomen black, with basal silvery-white lateral spots and the last two or three segments with traces of basal white bands; venter with many pale scales, the last three segments with broad basal silvery bands.

Legs deep brown, pale at base and ventral surface of femora, fore and mid legs unbanded, the hind with a basal white band to the first and second tarsals; ungues equal and simple.

Fork-cells small; first sub-marginal longer and narrower than the second posterior cell, its base nearer the base of the wing than that of the second posterior cell, its stem about half the length of the cell; stem of the second posterior nearly as long as the cell; posterior cross-vein twice its own length distant from the mid.

Halteres pale.

Length.—4.5 to 5 mm.

Habitat.—Newcastle, Jamaica, W. I. (Colonel Loscombe).

Time of capture.—July.

Observations.—Two ♀'s sent by Dr. Grabham, and collected by Colonel Loscombe. The species can at once be told from *Howardina walkeri* by its golden-scaled lines and sides and the hind legs having only two, not three, basal white bands.

There are no specimens of *Aëdes aurites* in the collection of the U. S. National Museum. Mr. Busck has examined the types in the British Museum, at our request, and says:

"*Howardina aurites* Theobald. Two types (both from Dr. Grabham, Jamaica), in rather bad condition, one with all legs lost, one with three legs, 1–2–3

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on the right side only. This latter has the two front tarsi unbanded, though somewhat lighter shaded at joints; on the last leg I can only make out one distinct white band on 1st joint, though there may be a lighter shade on 2nd joint also."

AËDES BUSCKII (Coquillett) Dyar & Knab.

Stegomyia buscki Coquillett, Can. Ent., xxxviii, 60, 1906.
Aëdes buscki Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 192, 1906.
Aëdes buscki Dyar, Proc. Ent. Soc. Wash., viii, 15, 1906.
Gymnometopa buscki Coquillett, Proc. Ent. Soc. Wash., vii, 183, 1906.
Haemagogus buscki Dyar & Knab, Proc. Biol. Soc. Wash., xix, 166, 1906.
Gymnometopa buscki Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 25, 1906.
Gymnometopa buscki Theobald, Mon. Culic., iv, 211, 1907.
Gymnometopa buscki Theobald, Mon. Culic., v, 219, 1910.

ORIGINAL DESCRIPTION OF STEGOMYIA BUSCKII:

Proboscis and palpi wholly black, no white scales on the first antennal joints, scales of occiput brown, a median stripe of yellow ones, changing to white anteriorly, the sides of occiput bordered with white ones, the lower half largely yellow scaled. Thorax brown-scaled, a median pair of widely-separated yellow scaled lines on the anterior three-fourths of the mesonotum, and between each of these and the adjacent wing is a line of similar scales on the posterior half, an interrupted line of white scales toward the sides of the mesonotum, and several spots on the pleura; scutellum brown scaled, and with a median stripe of white ones. Abdomen black scaled, with a tinge of bronze; venter yellow scaled, and with a lateral spot of white scales on the last three segments. Legs black scaled, those on under side of femora pale yellow, a dot of white scales at apex of each femur and tibia, bases of first three joints of the hind tarsi white scaled; tarsal claws in both sexes as in *mediovittata*. Length about 3 mm.

San Domingo, West Indies. A female and two males, collected by Mr. August Busck, after whom this handsome species is named. Type No. 9139, U. S. National Museum.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDES BUSCKII:

Female.—Proboscis rather long, subcylindrical, very slightly thickened apically, labellæ conically tapered; vestiture black; setæ short, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-sixth as long as the proboscis, slender; vestiture black; setæ fine, a few of the basal ones stouter. Antennæ filiform, the joints subequal, rugose, coarsely pilose, black; second joint slightly enlarged apically, pale at base; tori subspherical, with a cup-shaped apical excavation, luteous, brown within; hairs of whorls sparse, moderate, black. Clypeus rounded-triangular, convex, blackish-brown, nude. Eyes black. Occiput clothed with flat broad scales, narrow lanceolate ones along median line, black, a narrow silvery-white middle line continued forward between eyes and some scales projecting apically, margins of eyes and lower half of sides silvery-white and including a black patch; some upright forked black scales well back on the nape; setæ along margins of eyes coarse, black, no tuft projecting medianly.

Prothoracic lobes elliptical, remote dorsally, blackish, with a band of broad, flat silvery-white scales in the middle and with coarse black bristles. Mesonotum rich brown, clothed with narrow hair-like blackish-brown scales, with four longitudinal narrow lines of golden-yellow scales on the disk, the median pair beginning at anterior margin and terminating at antescutellar space, followed by a single golden-yellow line across the space, a slender golden-yellow line on each side of antescutellar space, running forward to beyond middle of disk; a lateral marginal line of silvery-white broad flat scales, involving anterior angles and running to roots of wings, somewhat waved and attenuated at its anterior and posterior thirds; bristles over roots of wings coarse, black. Scutellum trilobate, brownish, with small black scales, mid lobe with a patch of broad, flat silvery-white scales, each lobe with a small group of black bristles.

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Postnotum elliptical, prominent, luteous, nude. Pleuræ and coxæ yellowish, with small patches of silvery-white scales and with some black bristles.

Abdomen subcylindrical, tapered at the tip, sixth and seventh segments apically expanded beneath; dorsal vestiture of dull blue-black scales, a row of very large, silvery-white spots medianly on lateral margins of segments, showing in a dorsal view on sixth and seventh segments; first segment black scaled and with fine pale hairs; venter yellowish-white scaled, apical halves of fifth, sixth and seventh segments black, eighth segment all black-scaled; setæ abundant, especially ventrally.

Wings rather narrow, smoky-hyaline; petiole of second marginal cell about half as long as its cell, that of second posterior cell somewhat shorter than its cell; basal cross-vein distant about twice its own length from anterior cross-vein; scales brown, those on costa black with blue reflection, the outstanding ones narrowly ligulate, dense and broader on fork of second vein. Halteres ochraceous, knobs blackish at bases.

Legs slender, moderately long; vestiture black and white; femora yellowish-white at bases and beneath narrowly to tips; front and middle knees narrowly silvery, hind ones broadly so; tibiæ entirely blue-black, front tibiæ with a silvery-white spot dorsally at their apices; hind tarsi with broad white bands at bases of first three joints, the band on the third occupying two-thirds of the joint; middle tarsi with small white bands on bases of first two joints; fore tarsi without white bands. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Male.—Proboscis straight, long and slender, brownish-black scaled. Palpi very nearly as long as the proboscis, slender, straight, terminal joints not thickened; vestiture blue-black, a small whitish ring before middle of long joint; last two joints with a few small short setæ. Antennæ plumose, the last two joints long, slender, rugose, pilose black, the others short, whitish, with a black ring at insertions of hair-whorls; hairs long, not very dense, black. Coloration similar to the female. Abdomen elongate, subcylindrical, slightly expanded towards apex; eighth segment with a broad, basal, median silver spot; claspers with silver scales basally; no distinct lateral ciliation. Wings nearly as broad as in the female; stems of the fork-cells a little longer, the vestiture less abundant. Claw formula, 1.0–1.0–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 33, fig. 220): Side-pieces twice as long as wide, conically tapered; apical lobe absent, basal lobes semi-detached, conical, bearing a stout articulated terminal spine. Clasp-filament slender, a little thickened at base, with a rather short articulated terminal spine. Harpes concave, the inner margin thickened, strongly revolute, the tip bent outward, emarginate. Harpagones absent. Unci contiguous, revolute, forming a stout basal cylinder. Basal lobes small, approximate, each with four stout setæ.

Larva, Stage IV (plate 122, fig. 424).—Head rounded, narrowed before eyes, a slight notch at insertion of antennæ, front margin arcuate. Antennæ small, cylindrical, uniform, with a few sparsely distributed spines; a two-haired tuft near middle; three short spines, a long and a stout digit at apex. Upper pair of dorsal head-hairs single, lower pair double; ante-antennal tufts of four hairs. Mental plate triangular, a single apical tooth and fourteen on each side, small, the apical ones closely placed, the basal ones sharper and more remote. Mandible quadrangular; two filaments before apex; an outer row of cilia from a collar; ten filaments on outer margin, the three next the collar shorter; dentition of four teeth on a process, the first longest; a spine before, a broad filament and five feathered hairs within; process below deeply furcate, the upper limb

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sharply curved upward, each with a hair-tuft at tip, a row of hairs across the base; basal angle small and approximated to the process; five hairs within; a row of long hairs at base. Maxilla conically tapered, about as long as wide, divided by a narrow suture; inner half with two rows of cilia and four long spines on margin toward base, a tuft of long hairs at tip; outer half with a long and a short filament near the suture and a spine on the other side; palpus proportionately rather large, with two long and two short apical digits. Thorax rounded, wider than long; hairs abundant, the small hairs in coarse, stellate bunches. Abdomen moderate, the anterior segments shorter; lateral hairs of first segment multiple, triple on second, double on third to fifth, triple on sixth; secondary hairs in coarse stellate tufts, black. Air-tube short and stout, tapered outwardly, about two and one-half times as long as wide; pecten of a few well-spaced teeth, extending two-thirds the length of tube, closely followed by a single hair-tuft; single pecten-tooth a long spine with a basal branch. Lateral comb of eighth segment of about twenty large scales in a double row; single scale elongate and uniform, tip rather bluntly rounded, uniformly fringed with rather short spinules. Anal segment as long as broad, with dorsal plate reaching well down the sides, a row of long spines on posterior margin; dorsal tuft of two groups of long hairs; hair-tuft on posterior angles of plate of five long hairs; ventral brush of moderate tufts, with a small triangular plate on each side of barred area; anal gills long, about twice as long as the segment, broad and bluntly rounded.

The larvæ live in water held by vegetable tissues. Mr. Busck found them once in dirty, black water in cacao-shells and once in water in the flower-spathes of *Heliconia*.

Windward Islands, Lesser Antilles.

Dominica, July, 1905 (A. Busck); Guadeloupe, July, 1905 (A. Busck); Mont Pelée, Martinique, July, 1905 (A. Busck).

The normal habitat of the larvæ of *Aëdes busckii* can only be determined by further collections. It seems that in this species specialization of habits has not gone to the extreme that we find in most Sabethini, where the larval habitat is often restricted to a single plant. In some of our specimens of the larva the pecten-teeth of the air-tube extend beyond the insertion of the hair-tuft.

AËDES EXCRUCIANS (Walker).

Culex excrucians Walker, Ins. Saunders., 429, 1856.
Culex excrucians Giles, Gnats or Mosq., 260, 1900.
Culex excrucians Blanchard, Les Moustiques, 312, 1905.
Culex excrucians Theobald, Mon. Culic., v, 350, 1910.

ORIGINAL DESCRIPTION OF CULEX EXCRUCIANS:

Fœm.: *Fulva; proboscis testacea, apice fuscescens; antennæ fuscæ, basi testaceæ; abdomen fuscescens, fasciis testaceis; pedes testacei, tarsis pallide fuscis testaceo fasciatis; alæ subcinereæ, venis testaceis subciliatis; halteres apice fusci.*

Tawny. Proboscis testaceous, long, straight, slender, brownish at the tip. Antennæ brown, testaceous towards the base, a little shorter than the proboscis. Pectus paler than the thorax. Abdomen brownish, with a testaceous band on the hind border of each segment. Legs testaceous, long, slender; tibiæ darker than the femora; tarsi very pale brown, with a testaceous band at the base of each joint. Wings very slightly grayish; veins testaceous, slightly ciliated. Halteres testaceous, with brown knobs. Length of the body 4 lines; of the wings 7 lines.

Nova Scotia.

We are entirely unable to place this species from the description. The large size given by Walker (8 mm.), which is as large as *Psorophora*, is unusual in a northern mosquito and certainly much larger than any plain-colored mosquito of northern distribution known to us. The type is in the British Museum and has been examined by Giles, but we have found no clue to its identity in his

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descriptive notes. The apparent banding of the tarsi would seem to prevent its being referred as a synonym to *Culiseta impatiens* (see page 483). The specimens referred to by Howard as *Culex excrucians* (U. S. Dept. Agr., Div. Ent., Bull. 4, new ser., p. 22, 1896, and Bull. 25, new ser., p. 20, 1900) are *Mansonia perturbans*.

Genus HÆMAGOGUS Williston.

Hæmagogus Williston, Trans. Ent. Soc. Lond., 1896, 271, 1896.
Aëdes Giles (in part), Handb. Gnats or Mosq., 343, 1900.
Hæmagogus Theobald, Journ. Trop. Med., iv, 235, 1901 (without species).
Hæmagogus Theobald, Mon. Culic., ii, 238, 1901.
Hæmagogus Giles, Gnats or Mosq., 2 ed., 485, 1902.
Hæmagogus Neveu-Lemaire, Mém. Soc. Zool. France, xv, 224, 1902.
Hæmagogus Neveu-Lemaire, C. R. Soc. Biol. Paris, liv, 1331, 1902.
Hæmagogus Theobald, Mon. Culic., iii, 308, 1903.
Hæmagogus Theobald, Entomologist, xxxvi, 282, 1903.
Hæmagogus Lutz in Bourroul, Mosq. do Brasil, 54, 1904.
Hæmagogus Blanchard, Les Moustiques, 412, 1905.
Stegoconops Lutz, Imprensa Medica, 1905, 83, 1905.
Hæmagogus Theobald, Mosq. or Culic. of Jamaica, 8, 1905.
Hæmagogus Theobald, Gen. Ins., Dipt., fasc. 26, 37, 1905.
Aëdes Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xiv, 178, 188, 1906.
Hæmagogus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 14, 25, 1906.
Cacomyia Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 16, 25, 1906.
Hæmagogus Dyar & Knab (in part), Proc. Biol. Soc. Wash., xix, 165, 1906.
Hæmagogus Dyar & Knab, Can. Ent., xxxix, 48, 1907.
Hæmagogus Theobald (in part), Mon. Culic., iv, 550, 1907.
Cacomyia Theobald, Mon. Culic., iv, 554, 1907.
Stegoconops Peryassú (in part), Os Culicid. do Brazil, 34, 1908.
Hæmagogus Peryassú, Os Culicid. do Brazil, 37, 1908.
Hæmagogus Williston, Manual No. Amer. Dipt., 3 ed., 108, 1908.
Hæmagogus Dyar & Knab, Can. Ent., xl, 310, 1908.
Hæmagogus Theobald (in part), Mon. Culic., v, 493, 1910.
Cacomyia Theobald, Mon. Culic., v, 494, 1910.
Stegoconops Theobald (in part), Mon. Culic., v, 605, 1910.
Stegoconops Howard, Dyar & Knab, Mosq. No. & Centr. Amer. & W. Ind., i, 53, 64, 145, 147, 149, 150, 1913.

The type species are: Of *Hæmagogus* Williston, *Hæmagogus splendens* Williston; of *Stegoconops* Lutz, *Hæmagogus capricornii* Lutz; and of *Cacomyia* Coquillett, *Hæmagogus albomaculatus* Theobald.

Generic Diagnosis of Adult:

Proboscis long and slender. Palpi short in the female, in the male short in some species, long in others. Head elongated. Antennæ filiform in the female, the joints subequal, with basal whorls of sparse and moderately long hairs, plumose in the male. Prothoracic lobes large, closely approximate above, collar-like, the setæ inserted along the apical margin. Mesonotum without conspicuous setæ on the disk. Scutellum trilobate. Postnotum nude, sometimes with a few small setæ posteriorly. Abdomen subcylindrical in the female, tapering toward the tip; in the male more elongate, depressed, somewhat expanded apically. Legs rather long and slender, the claws in the female equal, toothed on the front and middle legs in some species, simple in others; in the male unequal and some of them toothed.

Generic Diagnosis of Larva:

The larvæ show the same generic characters as those of *Aëdes*. **(See page 612).**

Tropical America.

The genus *Hæmaçogus* is closely related to *Aëdes*, and, in the larva, shows no peculiarities available for generic definition. The male genitalia also show close resemblance to *Aëdes* and exhibit all the structures of the typical forms of that genus; the only peculiarity is the presence of large leaf-like scales on the side-pieces, and this is manifestly a weak character. The imagos differ from *Aëdes* primarily by the large collar-like prothoracic lobes, such as occur in most Sabethini; the resemblance to these is enhanced by the reduction of the thoracic bristles, the vestiture of flat metallic scales and the absence of upright forked

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scales from the occiput. This resemblance is made still more startling by the occurrence, in those species which further agree in the simple claws of the female (*splendens* and *albomaculatus*), of minute bristles on the postnotum. Mr. F. W. Edwards of the British Museum first informed us of the presence of such bristles on the type of *Hæmagogus splendens*. Examination of several of our specimens failed to reveal bristles on the postnotum, and this led us to conclude that Williston's genus was distinct and belonged to the Sabethini. Consequently we adopted the name *Stegoconops* for the forms before us (see volume ii of this work, pl. 23, figs. 162, 163, 164, pl. 24, fig. 165, pl. 77, pl. 126, figs. 438 and 439). Subsequent careful examination of a series reared from larvæ showed that one, two or three minute bristles are usually present in the two species above mentioned, although they are well back on the postnotum and difficult to detect. We are unable to accept the occurrence of these bristles as an indication of close relationship between *Hæmagogus* and the Sabethini, but incline rather to the view that the bristles have developed independently and that the other resemblances are due to convergence. Certain it is that there is no corresponding modification in the larval or genetalic structures of *Hæmagogus*, and that we must consider these as more fundamental, because less subject to adaptational modifications.

The species, fall into two well marked groups as indicated in our table of the adults. These groups have been treated as separate genera by Lutz, Coquillett and Theobald; but we consider their separation quite unnecessary.

All the species are inhabitants of water in hollow trees and similar situations, such as open bamboo-joints. It is probable that in suitable situations they will occur in artificial wooden receptacles holding water. We have no information concerning the egg-laying habits or the length of larval life, etc., although it is probable that the eggs are laid singly on the sides of the receptacles containing the water and that the length of larval life is considerable, as is the case with the tree-hole inhabiting species of *Aëdes*. We have no observations on the mating habits of the adults. It is probable that there are two different styles of copulation within the genus on account of the differences in claw structure between the species. The adults inhabit forests or shady places. The females suck blood. They are active during the daytime, as their brilliant colors would lead one to infer.

Tables of the Species.

Adults, structure, and coloration.

1. Second marginal cell longer than the second posterior cell; claws of female simple 2
   Second marginal cell shorter than the second posterior cell; claws of female toothed 3
2. Abdomen without spots dorsally..... *splendens* Williston (p. 865)
   Abdomen with basal segmental silvery white spots *albomaculatus* Theobald (p. 868)
3. Abdomen with segmental basal silvery bands..... *equinus* Theobald (p. 871)
   Abdomen with silvery bands on the last two or three segments only *capricornii* Lutz (p. 875)

Adults, male genitalia.

1. Terminal filament of clasp with a short apical spine; no rounded knob at the base of the clasp..... 2
   Terminal filament of clasp with a long apical spine; a rounded setose knob at the base of the clasp within..... 3
2. Harpago with a broad expanded filament..... *albomaculatus* Theobald (p. 870)
   Harpago with a small narrow filament..... *splendens* Williston (p. 866)
3. Harpago slender, elongate, with a small terminal filament; harpes long, slender, with a sharp point ..... *capricornii* Lutz (p. 876)
   Harpago stout, greatly developed, spinous in the middle, with a large subterminal expansion; harpes short, bluntly rounded *equinus* Theobald (p. 873)

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LARVÆ:

1. Scales of the lateral comb few, in a single or nearly single row..... 2
   Scales of the lateral comb more numerous, in a patch..... 3
2. Comb scales separate; body glabrous..... *equinus* Theobald (p. 873)
   Comb scales joined; body densely pilose..... *capricornii* Lutz (p. 877)
3. Comb scales large, simple; secondary abdominal hairs not stellate
   albomaculatus Theobald (p. 870)
   Comb scales small, fringed; secondary abdominal hairs stellate, long
   splendens Williston (p. 866)

HÆMAGOGUS SPLENDENS Williston.

Hæmagogus splendens Williston, Trans. Ent. Soc. Lond., 1896, 272, 1896.
Ædes splendens Giles, Handb. Gnats or Mosq., 355, 1900.
Hæmagogus cyaneus Theobald (not *Culex cyaneus* Fabricius), Mon. Culic., ii, 239, 1901.
Hæmagogus cyaneus Giles (not *Culex cyaneus* Fabricius), Handb. Gnats or Mosq., 2 ed., 485, 1902.
Hæmagogus cyaneus Theobald (not *Culex cyaneus* Fabricius), Mon. Culic., iii, 308, 1903.
Hæmagogus cyaneus Theobald (not *Culex cyaneus* Fabricius), Entomologist, xxxvi, 283, 1903.
Hæmagogus cyaneus Lutz in Bourroul (not *Culex cyaneus* Fabricius), Mosq. do Brasil, 66, 1904.
Hæmagogus cyaneus Blanchard (not *Culex cyaneus* Fabricius), Les Moustiques, 412, 1905.
Aëdes cyaneus Dyar & Knab (not *Culex cyaneus* Fabricius), Journ. N. Y. Ent. Soc., xiv, 202, 1906.
Aëdes cyaneus Dyar (not *Culex cyaneus* Fabricius), Proc. Ent. Soc. Wash., viii, 18, 1906.
Hæmagogus cyaneus Coquillett (not *Culex cyaneus* Fabricius), Dept. Agr., Bur. Ent., Tech. Ser. 11, 25, 1906.
Hæmagogus splendens Dyar & Knab, Proc. Biol. Soc. Wash., xix, 166, 1906.
Hæmagogus cyaneus Theobald (not *Culex cyaneus* Fabricius), Mon. Culic., iv, 550, 1907.
Hæmagogus cyaneus Peryassú (not *Culex cyaneus* Fabricius), Os Culicid. do Brazil, 51, 255, 1908.
Hæmagogus splendens Busck, Smiths. Misc. Colls., quart. iss., iii, 64, 1908.
Hæmagogus cyaneus Theobald (not *Culex cyaneus* Fabricius), Mon. Culic., v, 493, 1910.
Stegoconops lucifer Howard, Dyar & Knab, Mosq. No. & Centr. Amer. & W. Ind., ii, pl. 23, fig. 164, pl. 77, pl. 134, fig. 506, pl. 137, fig. 537, pl. 144, fig. 651, 1913.

ORIGINAL DESCRIPTION OF HÆMAGOGUS SPLENDENS.

♀. In ground-colour deep black, the base of the femora, and the coxæ in part, somewhat yellowish. Occiput, mesonotum and scutellum wholly covered with brilliant green and coppery squamulae; pleuræ densely snow-white squamulate. Abdomen brilliant steel-blue, in some reflections black; a spot on the sides of each segment snow-white. Legs blue, like the abdomen, shining black in some reflections; the undersides of the femora, towards the base, with white squamulæ. Wings hyaline, somewhat brownish in front, squamulæ black, evenly distributed. Length 5 mm.

Eight specimens. 1000 feet. The single male specimen was injured after the drawings were made. It does not appear to differ, however, from the female. The colouring must be much like that of *Culex cyaneus*, save the head and thorax.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF HÆMAGOGUS SPLENDENS:

Female.—Proboscis long, slender, subcylindrical, uniform, labellæ conically tapered; vestiture deep blue-black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi small, less than one-sixth as long as the proboscis; vestiture black, with a few moderate setæ. Antennæ filiform, the joints subequal, rugose, coarsely pilose, black; second joint slightly swollen beyond middle; tori rather small, subspherical, with a cup-shaped apical excavation, black, with a few minute hairs on inner side. Clypeus rounded triangular, convex, prominent, black, nude. Eyes black. Occiput clothed entirely with broad, flat, dark metallic blue scales with an iridescent reflection; posterior part of cheeks and under surface silver scaled; bristles along margins of eyes coarse, black, a pair of longer black ones projecting between the eyes.

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Prothoracic lobes elliptical, large, closely approximate dorsally, clothed with broad, metallic dark blue scales and with coarse, stiff, black marginal bristles. Mesonotum black, clothed with elliptical flat scales with bright metallic green, bronzy and blue reflections. Scutellum weakly trilobate, the middle lobe broad; blackish-brown, clothed with broad, flat, metallic blue scales, each lobe with a group of dark bristles. Postnotum elliptical, prominent, brownish-black, usually with one or two minute setæ close to posterior margin. Pleuræ and coxæ blackish, nearly solidly clothed with silvery-white flat scales; setæ minute, dark.

Abdomen subcylindrical, tapered posteriorly, sixth and seventh segments slightly expanded apically beneath; dorsal vestiture of metallic, shining blue and purple scales, a series of large, lateral, segmentary, basal, triangular silvery-white spots; first segment clothed with metallic blue scales in the middle, silvery ones at the sides, and with short, fine pale hairs at the sides; venter black scaled with metallic violaceous reflection and broad, basal, segmentary silvery bands.

Wings moderate, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell slightly longer than its cell; basal cross-vein distant about its own length from anterior cross-vein; scales brownish black with violet reflection, the outstanding ones narrowly ligulate. Halteres black, knobs metallic whitish scaled at tip.

Legs long and rather slender; vestiture dark metallic violet-blue; trochanters silvery-whitish; mid femora with a narrow silvery line beneath nearly to apex; hind femora broadly silvered on outer side to apical third. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 3 mm.

Male.—Proboscis slender, rather long, gently curved, black-scaled. Palpi short, about one-sixth the length of the proboscis. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, pale, broadly ringed with black at insertions of hair-whorls; hairs of whorls long, fine, but rather sparse. Coloration similar to the female. Wings narrower than in the female; stems of the fork-cells longer, that of the second marginal cell being as long as its cell, that of the second posterior longer; vestiture sparser. Abdomen elongate, slender, somewhat expanded towards apex, particularly the seventh and eighth segments beneath, these latter with many coarse black bristles; seventh segment, and sometimes the eighth, dorsally with a small silvery spot medianly at base. Claw formula, 1.0–1.0–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 23, fig. 164): Side-pieces over twice as long as wide, rounded at tips, a slight rounded seta-bearing prominence from which the clasp-filament arises; clasp-filament long, slender, curved, with a short articulated subterminal claw; side-piece with large outstanding scales along inner margin. Harpes narrowly elliptical, inner margin revolute, tip thickened and bent, with fine teeth. Harpagones with a long columnar stem, sinuate, capitate, bearing a small inserted lanceolate filament. Unci forming a large basal cone.

Larva, Stage IV (see figure of the entire larva, plate 77).—Head rounded, about as wide as long, rather evenly arcuate all around, a notch at insertion of antennæ. Antennæ moderate, slender, smooth, a single hair near the middle; at tip three hairs of different lengths and a digit on a pedestal. Eyes large, transverse. Upper pair of dorsal head-hairs single, long, lower pair double, short; ante-antennal tufts quadruple. Mental plate elongate triangular with stout central tooth and eight on each side, the first five short, rounded and closely set, the sixth sharp and longer than the preceding ones, the last two remote and basally placed. Mandible quadrangular, smooth without; two filaments from a notch before tip; an outer row of cilia from a collar; a row of long filaments on outer margin; dentition of four teeth on a slender process, the

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first long, the others appearing as rounded irregularities on its lower declivity; two long spines before, a furcate tooth at base, a row of serrate filaments within; process below widely furcate, the upper fork curved and erect, setose; five filamentous hairs within; a row of long hairs at base. Maxilla elongate, divided by a narrow suture; a row of stout spines on inner margin, and two lines of cilia; a linear tuft of long hairs at tip, bent backwards toward base; outer half with two subapical filaments near the suture and a spine on the other side; two rows of fine cilia; palpus rather long, projecting as far as maxilla, with two long and two short apical digits. Skin of body smooth. Thorax rounded, wider than long; hairs abundant, well tufted, the subdorsal prothoracic ones multiple. Abdomen slender, uniform, the anterior segments shorter; lateral tufts multiple on first segment, triple on second, double on third to sixth, single on seventh, all rather long; secondary hairs well developed; tracheal tubes broad, band-shaped, flexuous, wider in the air-tube. Air-tube stout, conically tapered on outer third, two and a half times as long as wide; pecten evenly spaced, running to middle, followed by a single tuft of four hairs; single pecten-tooth a long spine with a stout basal tooth. Lateral comb of eighth segment of many small scales in a triangular patch; single scale broad, rounded, evenly fringed with spinules. Anal segment longer than wide, with a dorsal plate reaching halfway down the sides, spined on posterior edge; dorsal tuft a long hair and brush on each side; a lateral three-haired tuft at angle of plate; ventral brush well developed, with some small preceding tufts; a little triangular plate on either side of barred area; anal gills very short, less than half as long as the segment, lower pair much smaller, not half as long as upper pair.

Mr. Knab found the larvæ in water in cacao-husks on the ground and in an old kerosene-can half filled with dirt and rubbish near a deserted house. Mr. Urich got them in a hollow tree. Mr. Busck got them in bamboo-joints and in tree-holes. Mr. Jennings found them mostly in tree-holes, but on several occasions in salt water in holes in rocks on the sea shore (Caldera Island, Panama). The larvæ evidently normally inhabit hollow trees, occasionally having recourse to artificial receptacles; their occurrence in rock-holes is less usual and is decidedly unexpected. The larvæ take a considerable time to mature; Mr. Knab was able to bring live larvæ from Costa Rica to Washington.

Tropical regions of America, exclusive of the Greater Antilles.

Bluefields, Nicaragua (W. F. Thornton); Port Limon, Costa Rica, September 28, 1905 (F. Knab); Zent, Costa Rica, September 26, 1905 (F. Knab); Lion Hill, Canal Zone, Panama (A. Busck); Tabernilla, Canal Zone, Panama, June 4, 1907 (A. Busck), April 14, 1909 (A. H. Jennings); Chagres River, Panama, May 20, 1907 (A. Busck); Caldera Island, Porto Bello Bay, Panama, January 4, 1908, February 14, 1909 (A. H. Jennings); Ancon, Canal Zone, Panama, July 1, 1908 (A. H. Jennings); Miraflores, Canal Zone, Panama, May 9, 1908 (A. H. Jennings); Bas Obispo, Canal Zone, Panama, July 16, 1908 (A. H. Jennings); Panama City, Panama (A. H. Jennings); San Juan, Trinidad (F. W. Urich). Reported also from St. Vincent, West Indies (Williston); British Guiana (Theobald); Pará (Theobald), States of Minas Geraes and São Paulo (Peryassú), Brazil.

Hæmagogus splendens was identified by Theobald in 1901 with *Culex cyaneus* Fabricius. The type of *Culex cyaneus* is in the Copenhagen Museum and has been examined by Mr. Busck and Dr. Böving, from whose observations we have concluded that it is really a *Sabethes* and it has been so treated on page 26 of this work. The types of *Hæmagogus splendens* are in the British Museum and Mr. Edwards has observed setæ upon the postnotum of these specimens. These setæ are minute and not easily detected and were overlooked by us, with the result that we considered our material a distinct species for which we proposed the name *Stegoconops lucifer*. Careful re-examination of our material

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has disclosed the presence of from one to three setæ on the postnotum of most of our specimens. These setæ are present also in *Hæmagogus albomaculatus*, but not in other members of the genus (see page 864).

HÆMAGOGUS ALBOMACULATUS Theobald.

Hæmagogus albomaculatus Theobald, Mon. Culic., iii, 398, 1903.
Hæmagogus albomaculatus Theobald, Entomologist, xxxvi, 283, 1903.
Hæmagogus albomaculatus Blanchard, Les Moustiques, 413, 1905.
Hæmagogus regalis Dyar & Knab, Proc. Biol. Soc. Wash., xix, 167, 1906.
Cacomyia albomaculata Theobald, Mon. Culic., iv, 556, 1907.
Hæmagogus regalis Busck, Smiths. Misc. Colls., quart. iss., iii, 64, 1906.
Cacomyia albomaculata Theobald, Mon. Culic., v, 494, 1910.
Hæmagogus regalis Theobald, Mon. Culic., v, 492, 1910.
Stegoconops albomaculatus Howard, Dyar & Knab, Mosq. No. & Centr. Amer. & W. Ind., i, 53, 65, ii, pl. 23, fig. 163, pl. 126, fig. 439, 1913.

ORIGINAL DESCRIPTION OF HÆMAGOGUS ALBOMACULATUS:

Head blue, metallic; thorax shiny black, with bronze, green and blue scales; abdomen metallic violet, the penultimate and antepenultimate segments with a median patch of white scales, laterally with white basal spots, largest at the base of the abdomen, forming almost a white line, venter basally white banded. Legs unbanded, ungues equal and simple. Wings unspotted, the first sub-marginal cell with its stem longer than the cell and the base of the second posterior cell nearer the base of the wing than that of the first sub-marginal.

♀. Head black, covered with metallic blue flat scales and with black bristles; proboscis and palpi covered with deep blue and black metallic scales; antennæ black, basal joint deep brown, second joint with some dull peacock blue scales.

Thorax shiny black (denuded), with flat black, blue, and dull ochraceous scales and some white ones in front of the roots of the wings, also a tuft of black scales and numerous black bristles over the roots of the wings; back of the mesonotum notched at the sides. Scutellum deep brown, with a few large central bristles and several large lateral ones, very much separated from the mesonotum; pleurae with flat silvery-white scales.

Abdomen covered with rich metallic violet scales, the penultimate and the antepenultimate segments with a silvery-white median basal patch, laterally the segments have basal white elongated triangular spots, forming almost a distinct lateral line; venter with basal white bands; the fourth segment with two large posterior border-bristles, the fifth with one very long black bristle, arising from the middle of the segment and passing over the sixth and with two border-bristles; remaining segments with a few much shorter ones.

Legs unbanded, bronzy brown and metallic blue and violet, with numerous black bristles; ungues equal and simple.

Wings with brown scales and tinged with brown; the first sub-marginal cell very slightly longer, but narrower than the second posterior cell, its base nearer the apex of the wing than that of the second posterior cell, its stem a little longer than the cell; stem of the second posterior cell, which is broad, nearly as long as the cell; posterior cross-vein about twice its own length distant from the mid cross-vein; scales at the base of the wing violet. Halteres with ochraceous stem and fuscous knob.

Length.—5 mm.

Habitat.—Cara Cara, Demerara River, and Pomeroon River, British Guiana (Dr. Low).

Observations.—Described from a single ♀ taken by Dr. Low. It differs from *H. cyaneus* in the wing venation and in having two white median abdominal spots. The curious abdominal chaetotactic character is also not seen in *H. cyaneus*, as far as I have observed.

Dr. Low sends the following note on this species: "The Indians from the Cabacaburi Mission on the Pomeroon river used to bring me samples of this species amongst the mosquitoes they caught at nights. I also caught it myself at night two miles below this, at Pickersgill. When sitting at a window in the police hut there they used to come in and settle on me. Time, morning 9 to 11 A. M., during bright sunlight. It would seem, therefore, that it bites by night and day. I often got them with blood in their stomachs. I only dissected a few, and in those there was no trace of embryos of *F. demarquaii* or *F. perstans*. Fairly common."

ORIGINAL DESCRIPTION OF HÆMAGOGUS REGALIS:

Proboscis long, black; head and thorax brilliant metallic blue and green; pleurae silvery; abdomen dark blue with silvery bands on all the segments above, broader

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below. Legs blue-black, the mid and hind femora white below towards base. Base of the first submarginal cell slightly nearer the base of wing than base of the second posterior cell.

22 specimens, Sonsonate, Salvador (F. Knab), San Juan, Trinidad (F. W. Urich), Cacao, Trece Aguas, Alta Vera Paz, Guatemala (Schwarz & Barber), Livingstone, Guatemala (H. S. Barber).

Type.—Cat. No. 10,024, U. S. Nat. Mus.

The larva was confused by us with that of *splendens* Williston (*cyaneus* Theobald, not Fabricius). The table (Journ. N. Y. Ent. Soc., xiv, 191, 1906) should be corrected under dichotomy 43 by striking out "short abdominal hairs stellate" and for "*cyaneus*" read "45". Add a new dichotomy, 45, as follows:

45. Pecten reaching over half of tube, of about 18 teeth; secondary abdominal hairs not stellate..... *regalis*
Pecten not reaching half of tube, of about 12 teeth; dorsal abdominal hairs stellate, long..... *splendens*

DESCRIPTION OF FEMALE, MALE, AND LARVA OF HÆMAGOGUS ALBOMACULATUS:

Female.—Proboscis moderately long, subcylindrical, uniform, labellæ conically tapered; vestiture deep blue-black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi small, about one-sixth as long as the proboscis; vestiture black; with a few moderate setæ. Antennæ filiform, the joints subequal, rugose, pilose, black; second joint slightly thickened towards apex; tori rather small, subspherical, with a cup-shaped apical excavation, black, with a few minute hairs on inner side. Clypeus prominent, rounded triangular, convex, black, nude. Eyes black. Occiput clothed with broad, flat metallic dark-blue scales with a violet reflection, margins of eyes silvery, sides behind and cheeks silver-scaled; setæ along margins of eyes small, black.

Prothoracic lobes large, closely approximate dorsally, collar-like; clothed with metallic, dark violet-blue scales and a few stiff black bristles. Mesonotum black, clothed with elliptical flat black scales with metallic green, olivaceous and blue reflections; bristles over roots of wings small, black. Scutellum trilobate, clothed with metallic-blue scales, each lobe with a group of black bristles. Postnotum elliptical, prominent, black, shining, usually nude, sometimes with one or more minute setæ close to posterior margin. Pleuræ and coxæ blackish, nearly solidly clothed with silvery-white flat scales; setæ minute, dark.

Abdomen subcylindrical, somewhat compressed at base, sixth and seventh segments apically expanded beneath, eighth segment tapered posteriorly; dorsal vestiture of metallic, shining blue and purple scales, a basal silvery band on fifth, sixth and seventh segments, a series of large, lateral, triangular, segmentary, basal silvery-white spots; first segment metallic violet-blue scaled in the middle, silvery at the sides, with some small dark hairs; venter violet-blue scaled, with broad basal silvery bands, except on last two segments.

Wings moderate, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell somewhat longer than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales brownish-black, the outstanding ones narrowly ligulate, denser and broader on forks of second vein. Halteres white, the knobs black with silvery-white scales at apices.

Legs slender and rather long; vestiture black with metallic violet-blue reflection, the scales somewhat raised and roughened on apical part of tibia and on first tarsal of hind legs; trochanters silvery-whitish; middle femora narrowly silvery beneath to apices; hind femora silvery beneath and on outer side of basal halves. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 3 mm.

Male.—Proboscis nearly straight, rather long, violet-black scaled. Palpi as in the female, short, one-sixth the length of the proboscis. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, pale, broadly ringed with black at insertions of hair-whorls; hairs of whorls long, fine but rather sparse. Coloration similar to the female. Abdomen slender,

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elongate, subcylindrical, enlarged towards apex beyond fifth segment; fifth to eighth segments with dorsal silvery bands; last segment with numerous coarse black setæ. Wings narrower than in the female, the stems of the fork-cells longer, that of the second marginal cell being as long as its cell; vestiture sparse. Claw formula, 1.0–1.0–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 23, fig. 163): Side-pieces twice as long as wide, rounded at tip; basal lobe represented by a large area of small setæ with tuberculate bases, a row of large outstanding scales on distal part of inner aspect. Clasp-filament long and slender, with an articulated subapical blunt claw. Harpes slender, subspatulate, inner margin thickened, tips recurved in a sharp hook, spined on inner side. Harpagones with a long columnar base, a few setæ along its sides, the tip expanded into a broad, thin, twisted leaf-like plate with a thickened edge. Unci contiguous, revolute, forming a large basal cylinder.

Larva, Stage IV (plate 126, fig. 439).—Head rounded, widest through eyes, a slight notch at insertion of antennæ, front evenly rounded. Antennæ small, slender, uniform, a small single hair near middle. Upper pair of dorsal head-hairs single, long, lower pair double, smaller, situated far down on the face; ante-antennal tufts small, in threes. Skin of body smooth. Lateral comb of the eighth segment of about twenty rather large scales in a patch three rows deep in middle, each scale broad, bluntly rounded, smooth. Air-tube stout, about two and a half times as long as wide, tapering outwardly, pecten of evenly spaced teeth not reaching to the middle, followed by a single three-haired tuft. Anal segment longer than wide, with a dorsal plate reaching beyond middle of sides, emarginate laterally; dorsal tuft a long hair and tuft on each side; lateral hair at angle of plate double, long; ventral brush well developed with some tufts preceding barred area, a small lateral chitinous triangular plate on either side of barred area; anal gills broad, blunt, short, upper pair not as long as the segment, lower pair much smaller.

Mr. Knab found the larvæ in old cocoanut-husks containing foul water; Mr. Urich found them in open water-filled bamboo-joints at Trinidad; Mr. Busck and Mr. Jennings found the larvæ most frequently in holes in trees. Mr. Busck obtained the larvæ from a pot-hole in a rock on Taboga Island. Mr. Jennings twice found them in a stream, their presence there probably being due to the emptying of some receptacle which had contained them. The larvæ normally inhabit water in hollow trees.

We have no further observations on the life history.

Mainland of tropical America.

Sonsonate, Salvador, August 30, 1905 (F. Knab); Cacao, Trece Aguas, Alta Vera Paz, Guatemala, April 26, 1906 (Schwarz & Barber); Livingstone, Guatemala, May 11, 1906 (H. S. Barber); Gatun, Canal Zone, Panama, June 10, 1907 (A. Busck); Ahorca Lagarto, Canal Zone, Panama, June 12, 1907 (A. Busck); Tabernilla, Canal Zone, Panama, June 4, 1907 (A. Busck), December 22, 1908 (A. H. Jennings); Las Cascadas, Canal Zone, Panama, July 17, 1907 (A. Busck); Taboga Island, Panama Bay, Panama, July 13, 1907 (A. Busck); Matachin, Canal Zone, Panama, May 5, 1908 (A. H. Jennings); Ancon, Canal Zone, Panama, July 1, 1908 (A. H. Jennings); Trinidad, British West Indies (F. W. Urich, A. Busck). Reported also from British Guiana (Theobald).

Hæmagogus albomaculatus is closely allied to *H. splendens* and occupies the same geographical region. It presents, however, certain differences in all the stages, so that we have no doubt that there are two distinct, although closely allied species.

Hæmagogus albomaculatus was founded upon the presence of a large seta on the fourth abdominal segment; we had seen no specimen showing such a

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characteristic and suspected an error. Mr. Busck has examined the type of *albomaculatus* in the British Museum at our request, and reports:

"Three specimens from British Guiana from Dr. Low, one of them labeled type; on the type specimen there is a small, probably extraneous, hair on the fourth abdominal segment, which I can not perceive in the two other specimens, which appear quite smooth."

It therefore appears from Mr. Busck's examination that this seta is extraneous, and upon its elimination from the description, we are able to recognize the species. It is evidently the one described by Dyar & Knab as *Hæmagogus regalis*.

Coquillett placed *albomaculatus* in his genus *Cacomyia* in which the female has toothed claws and a short second marginal cell. This was due to his having misidentified specimens of *Hæmagogus capricornii* as this species. Theobald, in the fourth volume of his Monograph, p. 554, follows Coquillett in placing *albomaculatus* in *Cacomyia;* but the characters there given agree with *capricornii* and the reference will accordingly be found under that species.

HÆMAGOGUS EQUINUS Theobald.

Hæmagogus equinus Theobald, Entomologist, xxxvi, 282, 1903.
Hæmagogus equinus Theobald & Grabham, Mosq. or Culic. of Jamaica, 37, 1905.
Aëdes philosophicus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 190, 195, 1906.
Aëdes philosophicus Dyar, Proc. Ent. Soc. Wash., viii, 19, 1906.
Aëdes philosophicus Dyar & Knab, Proc. Biol. Soc. Wash., xix, 164, 1906.
Aëdes affirmatus Dyar & Knab, Proc. Biol. Soc. Wash., xix, 164, 1906.
Cacomyia equinus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. No. 11, 25, 1906.
Cacomyia equina Theobald, Mon. Culic., iv, 554, 1907.
Hæmagogus affirmatus Busck, Smiths. Misc. Colls., quart. iss., iii, 64, 1908.
Cacomyia equina Theobald, Mon. Culic., v, 494, 1910.
Aëdes affirmatus Theobald, Mon. Culic., v, 597, 1910.
Stegoconops equinus Howard, Dyar & Knab, Mosq. No. & Centr. Amer. & W. Ind., i, 53; ii, pl. 23, fig. 162, 1913.

ORIGINAL DESCRIPTION OF HÆMAGOGUS EQUINUS:

Head metallic violet, white between the eyes in front; palpi and proboscis black; antennae pale brown. Thorax metallic green; pleurae snowy white. Abdomen bright metallic violet, with three prominent and one faint silvery white basal bands and white lateral spots. Legs unbanded, deep brown; femora white beneath. Wings with violet reflections, iridescent.

♀. Head clothed with flat metallic violet scales, except a patch between the eyes, which are white, and at the sides, where they are grey and black; black bristles project over the eyes, and there is a trace of a narrow pale border surrounding them; clypeus with a frosty sheen; palpi black; proboscis black, curved upwards, nearly as long as the whole body; antennae pale brown, basal segments deep brown, with dusky scales on the large basal and second segments. Thorax black, covered with large flat apple-green metallic scales, rounded at their apices and irregularly disposed over the mesonotum; a patch of almost silvery white ones just in front of the roots of the wings, with also long dense black bristles; scutellum with flat green and blue scales and black border-bristles; prothoracic lobes and pleurae silvery white. Abdomen rich metallic violet; the first segment with an oblique white line on each side; the second and third unadorned; the fourth with a few large basal white scales; the fifth, sixth and seventh segments with basal white bands; border-bristles short, black; each segment with a large basal silvery white lateral spot; venter pure silvery white; each segment with a median black spot, the last two segments projecting downwards, and giving the appearance of two ventral black tufts. Legs unbanded, deep brown, with metallic violet reflections, and a pale knee spot to the mid and hind pair; femora white beneath; ungues small, equal, and simple. Wings faintly tinged with brown, metallic violet and iridescent in certain lights; first submarginal cell slightly longer and narrower than the second posterior cell, its base nearer the apex of the wing, its stem longer than the cell; stem of the second posterior longer than the cell; posterior cross-vein rather more than its own length distant from the mid cross-vein; halteres with ochraceous stem and fuscous knob. Length, 4–5 mm.

Hab. Kingston, Jamaica, W. I.

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Time of capture. August (24th).

Observations.—Described from a single perfect specimen. Dr. Grabham took this brilliant species feeding on a horse. He took two specimens, and mentions that "it is by far the most brilliant species found here, and evidently uncommon." It was taken at 7 p. m. at the lower end of Old Pound Road. It resembles *H. cyaneus*, Fabricius, but the venation is different, the first submarginal cell being smaller, and having its base nearer the apex of the wing, whilst in *cyaneus* it is nearer the base; moreover, the abdomen is adorned. It also approaches *H. albomaculatus*, Theob., but the abdomen has not the curious chætotactic characters seen in that species and is banded, not having the two median spots seen in *albomaculatus*.

The three species of *Hæmagogus* tabulate as follows:

A. Abdomen unadorned. Base of first submarginal cell nearer base of wing than the base of the second posterior cell.. *cyaneus*, Fab.= *splendens*, Willis.

AA. Abdomen adorned.

a. Base of first submarginal cell nearer apex of wing than that of posterior cell.

b. With prominent chætæ and two median basal white spots *albomaculatus*, Theob.

bb. No prominent chætæ, but basal white bands and a white oblique stripe on each side of first segment..... *equinus*, Theob.

ORIGINAL DESCRIPTION OF AËDES PHILOSOPHICUS:

The characters are indicated in the table. It was collected by the junior author at Tehuantepec, Salina Cruz, Acapulco, Mexico, and Sonsonate, Salvador. The specimens were named "*Hæmagogus equinus* Theobald" by Mr. Coquillett, but we are unaware that any species has been so named. The *Culex equinus* of Linnæus and Fabricius is said to be probably a *Simulium*.

The following is an abstract of the table:

1.	Air tube with the tuft beyond the pecten.....	8
8.	Pecten of the air tube with evenly spaced teeth.....	13
13.	Comb scales few, in a single or irregularly single row.....	14
14.	Anal segment not ringed, at least a small space along ventral line.	18
18.	Comb scales long, pointed, thorn-shaped.....	*philosophicus*

ORIGINAL DESCRIPTION OF AËDES AFFIRMATUS:

Shining blue, like *Hæmagogus splendens* Williston, but the female with the fore and middle tarsal claws toothed. Head and thorax clothed with metallic blue scales, pleurae silvery white; abdomen dark blue above, the first segment with a white bar on each side, below with silvery white segmental bands. Legs blue-black, middle and hind femora with a silvery white spot at tip, the middle femora narrowly white lined below, the posterior ones very broadly so for the basal three-fourths. Base of first submedian cell nearer apex of wing than base of second posterior cell.

Four specimens, Santa Lucrecia, State of Vera Cruz, and Salina Cruz, State of Oaxaca, Mexico; Las Loras, near Puntarenas, and Rio Aranjuez, Puntarenas, Costa Rica (F. Knab).

Type.—Cat. No. 10,023, U. S. Nat. Mus.

The larva is unknown.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF HÆMAGOGUS EQUINUS:

Female.—Proboscis long, slender, subcylindrical, uniform, labellæ conically tapered; vestiture deep violet-blue; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi small, about one-sixth as long as the proboscis; vestiture deep violet-blue, with a few moderate setæ. Antennæ filiform, the joints subequal, rugose, coarsely pilose, brown; second joint slightly thickened towards apex and with a few small scales; tori subspherical, with a cup-shaped apical excavation, black, with a few minute hairs on inner side. Clypeus rounded triangular, prominent, convex, black, shining, nude. Eyes black. Occiput clothed with broad, flat metallic-blue scales, a white margin along the eyes, cheeks white; setæ along margins of eyes moderate, black.

Prothoracic lobes large, closely approximate dorsally, collar-like, clothed with broad, flat metallic blue scales above, white ones on anterior edge and below, a few stiff black bristles on apical margin. Mesonotum black, clothed with elliptical, flat, metallic blue scales with green and olivaceous reflections;

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bristles over roots of wings short, black. Scutellum trilobate, middle lobe broad; clothed with broad, flat, metallic green and blue scales, each lobe with a group of black bristles. Postnotum elliptical, prominent, black, slightly pruinose, nude. Pleuræ and coxæ blackish, nearly solidly clothed with flat silvery-white scales; setæ minute, dark.

Abdomen subcylindrical, sixth and seventh segments apically enlarged beneath, eighth segment tapered posteriorly; dorsal vestiture of metallic, shining blue scales, the segments beyond the second with a basal silvery-white patch becoming bands on sixth and seventh segments, a series of large, lateral, triangular, segmentary, basal silvery-white spots; first segment dark metallic blue scaled on the disk, silvery-white at the sides, with fine dark hairs; venter dark metallic blue scaled, with silvery segmentary basal bands.

Wings moderate, hyaline; petiole of second marginal cell somewhat longer than its cell, that of second posterior cell longer than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales brownish-black, on the costa black with a blue reflection, the outstanding ones narrowly ligulate, denser and broader on the second vein. Halteres whitish, with the knobs black.

Legs rather long and slender; vestiture black with dark violet-blue reflection; trochanters silvery-whitish; hind femora silvery-white beneath and on outer side to near apex; knees of middle and hind legs silvery-white scaled. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3 mm.

Male.—Proboscis nearly straight, long and slender, black scaled. Palpi about three-fourths as long as the proboscis, slender, uniform, the last two joints with a few stiff bristles; vestiture dark violet-blue. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, pale, broadly ringed with black at insertions of hair-whorls; hairs of whorls long, fine, black, and rather dense. Prothoracic lobes less closely approximate dorsally than in the female. Coloration similar to the female. Abdomen elongate, subcylindrical, slightly enlarged apically, dorsally with all but the second segment with basal silvery bands; lateral ciliation short, rather sparse, fine, blackish. Wings narrower than in the female, the stems of the fork-cells longer; vestiture sparse. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 23, fig. 162): Side-pieces about twice as long as wide, rounded at tip; basal lobe represented by a small rounded protuberance at base, densely setose; a row of large outstanding scales on inner aspect of side-piece. Clasp-filament short and slender, with a long articulated terminal spine. Harpes broad, wide at base, margin narrowly recurved, tips rounded. Harpagones with a thick, bent columnar base, pilose, terminated at the tip by a thin, broad, leaf-like twisted plate. Unci contiguous, revolute, forming a small basal cone. No basal appendages.

Larva, Stage IV.—Head rounded, widest through the eyes, a slight notch at insertion of antennæ, front margin broadly rounded. Antennæ moderate, slender, very sparsely spined, a single hair near middle; four irregular apical spines and a long digit with a small subbasal branch. Both pairs of dorsal head-hairs single, ante-antennal tufts triple. Mental plate triangular, with a stout central tooth and eight on each side, the two basal ones remote and angular, the outer one small and very remote. Mandible quadrangular, a few spines at base; two filaments from a notch before tip; an outer row of cilia from a collar; a row of long filaments on outer margin; dentition of a curved tooth on a process with three little ones on the lower declivity and a larger one below; a smooth filament and row of feathered hairs within; process below

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widely furcate, with a row of hairs along margin and a tuft at tip of each limb; basal angle slight; a row of hairs within and a row at base. Maxilla irregularly hemispherical, divided by a suture; inner half mostly covered with hairs, those on margin longer and stiffer; a row of long stout hairs at tip; outer half with two small filaments near tip, a subapical spine and a patch of fine hairs; palpus moderate, slender, with five small apical digits. Skin of body smooth. Thorax rounded, wider than long. Abdomen moderate, anterior segments shorter; lateral hairs in threes on first two segments, in twos on third to fifth; subdorsal hairs in stellate tufts. Air-tube stout, tapered outwardly, about three times as long as wide; pecten reaching nearly to middle, of stout closely placed teeth, the teeth with a single basal branch; a single three-haired tuft beyond pecten. Lateral comb of eighth segment of twelve scales in a single row; single scale a thorn-shaped spine fringed with very short fine spinules. Anal segment as long as broad, with a dorsal plate reaching well down the sides, a row of long spines on its posterior margin; dorsal tuft a long hair and brush on each side; a lateral multiple tuft on posterior angle of plate; ventral brush well developed, with hairs preceding the barred area and a small triangular plate on each side; anal gills moderate, about as long as the segment, the lower pair shorter than the upper.

Mr. Knab found the larvæ in water in a hole in a tree-trunk at Tehuantepec. Also in a tree-hole at Salina Cruz, Mexico. Concerning the latter locality he says: "The presence of blue mosquitoes led to a search for hollow trees and at last one was found. A tree, perhaps a foot through, had a hole into which the hand could barely be inserted. It contained liquid as dark as strong coffee and in this were larvæ and pupæ." At Acapulco, Mexico, Mr. Knab encountered the species in a hollow in a large surface root of a tree, containing more than a quart of very dark liquid with numerous larvæ, apparently all of one species. Again in the village of San Antonio, near Sonsonate, Salvador, there was a large tree with widely spreading surface roots. Two holes in these roots contained water and larvæ of this species. Mr. Busck bred a specimen from water in broken bamboos on Tobago Island, near Trinidad, West Indies. The larvæ will probably be found to occur occasionally in artificial receptacles as well as in tree-holes. A female was taken by Dr. Grabham biting a horse. We have no other observations on the life history.

Tropical America.

Acapulco, Mexico, July 30, 1905 (F. Knab); Salina Cruz, Mexico, July 15, 1905 (F. Knab); Tehuantepec, Mexico, July 1, 1905 (F. Knab); Las Peñas, State of Jalisco, Mexico, July 18, 1903 (A. Dugès); Tonala, State of Chiapas, Mexico (A. Dugès); Santa Lucrecia, State of Vera Cruz, Mexico, June 19, 1905 (F. Knab); Frontera, State of Tabasco, Mexico, April 28 (C. H. T. Townsend); Sonsonate, Salvador, August 18, 1905 (F. Knab); Izalco, Salvador, August 21, 1905 (F. Knab); Las Loras, Costa Rica, September 8, 1905 (F. Knab); Rio Aranjuez, Costa Rica, September 12, 1905 (F. Knab); San José, Costa Rica, September 21, 1905 (F. Knab); Lion Hill, Canal Zone, Panama (A. Busck); Miraflores, Canal Zone, Panama, May 9, 1908 (A. H. Jennings); Ancon, Canal Zone, Panama, February 19, 1908 (A. H. Jennings); Schepmoed, British Guiana, January 29, 1906 (E. D. Rowland); Tobago Island, near Trinidad, July, 1905 (A. Busck); Kingston, Jamaica, July 8, 1903 (M. Grabham).

In describing *Hæmagogus equinus* Theobald states positively that the claws of the female are simple, and repeats the statement in the fourth volume of his work. However, he mentions two specimens, one of which was in the possession of Dr. Grabham. This we have examined, through the kindness of Dr. Grabham, and find the claws to be toothed. Dr. Howard has since examined the other specimen in the British Museum and found the claws to be toothed. We

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are therefore able to positively identify this species with our *Aëdes philosophicus*, described from Mexico. *Aëdes affirmatus* proves to be the same species, the describers having been misled as to its characters by the imperfect condition of the captured specimens.

HÆMAGOGUS CAPRICORNII Lutz.

Hæmagogus capricornii Lutz in Bourroul, Mosq. do Brasil, 66, 1904.
Stegoconops capricorni Lutz, Imprensa Medica, 1905, 83, 1905.
Aëdes capricornii Dyar & Knab, Proc. Biol. Soc. Wash., xix, 163, 1906.
Hæmagogus albomaculatus Dyar & Knab (not Theobald), Proc. Biol. Soc. Wash., xix, 166, 1906.
Cacomyia albomaculatus Coquillett (not Theobald), U. S. Dept. Agr., Bur. Ent., Tech. Ser. No. 11, 25, 1906.
Cacomyia albomaculata Theobald (not Theobald), Mon. Culic., iv, 554, 1907.
Stegoconops capricorni Peryassú, Os Culic. do Brazil, 45, 172, 1908.
Hæmagogus capricornii Theobald, Mon. Culic., v, 493, 1910.
Stegoconops capricornii Theobald, Mon. Culic., v, 606, 1910.
Stegoconops capricornii Howard, Dyar & Knab, Mosq. No. & Centr. Amer. & W. Ind., 1, 65; ii, pl. 24, fig. 165, pl. 126, fig. 438, 1913.

ORIGINAL DESCRIPTION OF STEGOCONOPS CAPRICORNI:

(FEMEA). Comprimento do corpo 5 mm., sem a tromba que mede 2,5 mm. Côr geral azul metallico escura, sendo o fundo desnudado preto.

Tromba—Comprida, preta, com brilho azul escuro, quasi do comprimento do abdomen; os labellos amarellos na ponta, onde ha pellos finos e alguns um pouco maiores no lado inferior da raiz.

Antennas—Quasi do mesmo tamanho que a tromba. Torus muito escuro, quasi preto mas com brilho esbranquiçado e com pellos curtos e escuros do lado interno; no flagello tanto os pellos maiores como os menores são de côr preta, porém os ultimos com brilho prateado.

Palpos—Pretos, com brilho azul e muitos pellos escuros.

Clypeus—Como o torus das antennas.

Occiput—Fundo preto; na margem posterior dos olhos uma fileira de pequenas escamas brancas, espatuladas; o resto é coberto de escamas maiores, chatas e imbricadas, de côr azul metallico; estas, como tambem as do prothorax, pleuras, mesonotum, abdomen e extremidades, são espatuladas com a ponta mais ou menos arredondada; pelo lado de fóra e na região mental são substituidas por escamas branco-nacaradas.

Lobulos prothoracicos—Muito salientes, com pellos escuros e escamas iguaes em forma, côr e agrupamento, ás do occiput.

Mesonotum—Côr preta, escamas obovaes iridescentes em verde-azul, bronze e cobre, como pennas de beija-flor. As mesmas, um pouco alongadas, encontram-se no scutellum.

Pleuras—Escamas branco-nacaradas, formando uma mancha continua de brilho branco um pouco prateado.

Scutellum—Nos lobos lateraes 3 para 4 pellos maiores, no medio 2 para 4. Acima da raiz das azas ha pellos grossos, escuros, em numero maior, que seguem sobre a margem do scutellum, onde existem nos lobos lateraes e no mediano, em numero variavel, como vimos, por serem em parte substituidos por outros mais curtos.

Abdomen—Em cima de côr uniforme, azul metallico escuro, havendo apenas na base dos ultimos segmentos algumas escamas brancas; estas tamben se acham na face ventral, onde cobrem de modo uniforme os primeiros segmentos, e formam manchas obliquas no lado dos ultimos; a conformação dos tres ultimos segmentos segue o typo do genero Carrollia e Gualteria.

Azas—Escamas medianas espatuladas, curtas e largas, com brilho metallico e outras de côr cinzenta, compridas e estreitas, do typo do genero Culex; cellulas forqueadas pequenas, menores do que os seus pedunculos; a primeira mais estreita que a segunda; as duas primeiras nervuras transversaes formam um angulo obtuso, aberto para a base, da qual a terceira se approxima por mais do seu comprimento.

Pernas—De azul escuro uniforme, com excepção do aspecto inferior do femur posterior, que é coberto de escamas nacaradas; ha muitos espinhos, principalmente no lado inferior das tibiæ posteriores, onde são visiveis macroscopicamente.

Unhas das patas anteriores, iguaes, maiores e com dente na base; as das posteriores, diminutas, iguaes e inernes.

NOTA—Esta especie silvestre predomina na zona atravessada pelo tropico de Capricornio, do qual o nome generico é derivado. Não conheço o hæmagogus cyaneus, mas pela descripção trata-se de um mosquito semelhante, comquanto dif-

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ferente no genero e na especie. Desconheço o macho, mas os caracteres da femea indicam que deve ser collocado ao lado do stegoconops leucomelas.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF HÆMAGOGUS CAPRICORNII:

Female.—Proboscis rather long and slender, subcylindrical, uniform labellæ conically tapered; vestiture deep blue-black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi small, about one-sixth as long as the proboscis; vestiture metallic violet-black, with a few moderate setæ. Antennæ filiform, the joints subequal, rugose, pilose, black; second joint distinctly swollen at middle; tori rather small, subspherical, with a cup-shaped apical excavation, black, with a few minute hairs on inner side; hairs of whorls sparse, rather long, black. Clypeus prominent, rounded triangular, flattened, black, nude. Eyes black. Occiput clothed with broad, flat, dark violet-blue scales with a metallic reflection; cheeks and margins of eyes appearing silvery; setæ along margins of eyes coarse, black, those projecting between the eyes also black.

Prothoracic lobes elliptical, large, collar-like, closely approximate dorsally, clothed with broad, flat, dark metallic blue scales and a few stiff black bristles. Mesonotum black, clothed with elliptical, flat, dark scales with bright green, blue and bronzy metallic reflections; bristles over roots of wings black. Scutellum trilobate, middle lobe broad, clothed with broad metallic blue scales, each lobe with a group of dark bristles. Postnotum elliptical, prominent, brownish-black, shining, nude. Pleuræ and coxæ blackish, nearly solidly clothed with silvery-white flat scales; setæ minute, dark.

Abdomen subcylindrical, slightly tapered posteriorly, the sixth and seventh segments apically expanded beneath; dorsal vestiture of bright metallic violet and purple scales, a lateral series of large, subquadrate, segmentary basal silvery-white spots, showing in dorsal view on sixth, seventh and eighth segments, continued dorsally as narrow basal bands on the last two; first segment metallic violet scaled with a silvery spot at the sides and with many short, fine dark hairs; venter violaceous scaled, with narrow segmental basal silvery bands, the scales on sixth and seventh segments roughened.

Wings rather narrow, hyaline; petiole of second marginal cell longer than its cell, that of second posterior cell longer than its cell; basal cross-vein distant about its own length from anterior cross-vein; scales brownish-black, a blue reflection on the costa, outstanding ones narrowly ligulate. Halteres whitish, with black knobs.

Legs rather long, moderately slender; vestiture dark metallic violet; trochanters silvery-whitish; mid femora with scattered white scales below; hind femora broadly silvery-white below nearly to tip; scales somewhat roughened, particularly on hind tibiæ and tarsi. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3 mm.

Male.—Proboscis rather long and slender, somewhat upcurved, black. Palpi short, about one-eighth the length of the proboscis, violet-black scaled. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, pale, ringed with black at insertions of hair-whorls; hairs of whorls long, fine and dense. Wings narrower than in the female, the stems of the fork-cells longer; vestiture sparse. Coloration similar to the female. Abdomen hardly more elongate than in the female; seventh and eighth segments much dilated, apically with coarse, long, sub-erect black scales; no distinct lateral ciliation. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 24, fig. 165): Side-pieces twice as long as wide, conically tapered; basal lobe a small rounded protuberance at the base, densely setose; a row of large outstanding scales on inner aspect. Clasp-filament moderate, with a long, articulated terminal spine. Harpes slender, subspatulate, inner margin thickened, tips recurved in a minute hook, minutely dentate on margin. Har-

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pagones with a slender, long, columnar base, pilose, flexuous, bearing an articulated terminal filament of about the same width as the stem. Unci contiguous, revolute, forming a large basal cylinder.

Larva, Stage IV (plate 126, fig. 438).—Head rounded, widest through eyes; antennæ rather small, slender, smooth, a single hair near middle; both pairs of dorsal head-hairs in twos, the lower pair situated rather low down on face; anteantennal tufts of three hairs, small. Skin of body coarsely and densely hairy. Lateral comb of eighth segment of eight scales in a straight row attached to a small chitinous plate, each scale with broad body and long sharp tip, smooth, without lateral fringes. Air-tube stout, about two and a half times as long as wide, tapered outwardly; pecten of about fifteen evenly spaced short teeth and reaching about to middle of tube, followed by a two-haired tuft. Anal segment longer than wide, with a dorsal plate, notched at the sides, with a few long spines along its posterior border; dorsal tuft a long hair and tuft on each side; tufts of posterior angles six-haired and very long; ventral brush long but sparse with tufts preceding the barred area for a short distance; a small triangular plate on either side of barred area; anal gills not as long as segment, stout, but sharply pointed, equal.

The larvæ live in water in tree-holes and probably also in bamboo, as Mr. Jennings captured adults in a bamboo woods.

Tropical America, less distributed towards the North than the other species of the genus.

Tabernilla, Canal Zone, Panama, May 13, 1908 (A. H. Jennings); Caldera Island, Porto Bello Bay, Panama (A. H. Jennings); St. Anns, Trinidad (F. W. Urich). Reported also from State of São Paulo (Lutz) and Juiz de Fóra and Oliveira, State of Minas Geraes, Brazil (Peryassú).

Coquillett placed *Hæmagogus capricornii* in his genus *Cacomyia* and the short palpi of the male caused him to confuse it with *Hæmagogus albomaculatus*, a species which has simple claws in the female. Theobald followed Coquillett and placed *albomaculatus* in *Cacomyia*, but his statement about the venation, taken from Coquillett, applies to the present species. Neither author mentions the structure of the female claws in *Cacomyia*. Theobald's repetition of Coquillett's reference of *albomaculatus* to *Cacomyia* in the fourth volume of his work is doubtless due to the haste of compilation.

Genus ORTHOPODOMYIA Theobald.

Stegomyia Theobald (in part), Mon. Culic., i, 283, 1901.
Orthopodomyia Theobald, Entomologist, xxxvii, 236, 1904.
Bancroftia Lutz in Bourroul, Mosquitos do Brasil, 59, 1904.
Stegomyia Felt (in part), Bull. 79, N. Y. State Mus., 338, 391*d*, 1904.
Bancroftia Lutz, Imprensa Med., 1905, 68, 1905.
Stegomyia Blanchard (in part), Les Moustiques, 247, 1905.
Finlaya Blanchard (in part), Les Moustiques, 630, 1905.
Bancroftia Blanchard, Les Moustiques, 632, 1905.
Pneumaculex Dyar, Proc. Ent. Soc. Wash., vii, 45, 46, 1905.
Stegomyia Theobald (in part), Gen. Ins., Dipt., fasc. 26, 18, 1905.
Finlaya Theobald (in part), Gen. Ins., Dipt., fasc. 26, 32, 1905.
Mansonia Dyar & Knab (not Blanchard), Journ. N. Y. Ent. Soc., xiv, 184, 1906.
Mansonia Coquillett (in part, not Blanchard), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 16, 25, 1906.
Pneumaculex Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 16, 26, 1906.
Mansonia Dyar & Knab (in part, not Blanchard), Can. Ent., xxxix, 48, 1907.
Bancroftia Theobald, Mon. Culic., iv, 521, 1907.
Pneumaculex Theobald, Mon. Culic., iv, 523, 1907.
Orthopodomyia Theobald, Mon. Culic., iv, 527, 1907.
Mansonia Knab (not Blanchard), Ent. News, xviii, 153, 1907.
Bancroftia Peryassú, Os Culicideos do Brazil, 36, 1908.
Mansonia Williston (in part, not Blanchard), Man. No. Am. Dipt., 3 ed., 107, 1908.
Bancroftia Dyar & Knab, Ent. News, xxi, 264, 1910.

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Bancroftia Theobald, Mon. Culic., v, 118, 469, 1910.
Pneumaculex Theobald, Mon. Culic., v, 118, 469, 1910.
Orthopodomyia Theobald, Mon. Culic., v, 118, 470, 1910.
Thomasina Newstead & Carter, Ann. Trop. Med. & Par., Ser. T. M., iv, 553, 1911.
Bancroftia Howard, Dyar & Knab, Mosq. No. & Centr. Amer. & W. Ind., i, 53, 63, 65, 70, 74, 93, 94, 95, 144, 184, 1913.
Orthopodomyia Edwards, Bull. Ent. Res., iv, 239, 1913.

The type species are: Of *Orthopodomyia* Theobald, *Orthopodomyia albipes* Leicester; of *Bancroftia* Lutz, *Bancroftia albicosta* Lutz; of *Pneumaculex* Dyar, *Culex signifer* Coquillett; of *Thomasina* Newstead & Carter, *Mansonia longipalpis* Newstead & Thomas.

GENERIC DIAGNOSIS OF ADULT:

Proboscis rather long and slender; palpi rather short in the female, long in the male. Antennæ slender and filiform in the female, the joints with rather small basal whorls; plumose in the male, the last two joints long and slender, the others short but longer than usual in males, stout, giving the shaft a rigid appearance, with basal whorls of long hairs. Prothoracic lobes remote dorsally. Mesonotum with series of coarse long setæ along the sides and fewer upon the disk. Scutellum rather feebly trilobate. Postnotum nude. Abdomen subcylindrical, blunt at the tip in the female, the cerci visible; scarcely expanded in the male, the lateral ciliation slight. Legs long and rather slender, the fourth joint of the front tarsi much shorter than the fifth in both sexes; claws simple in the female, unequal and some of them toothed in the male.

GENERIC DIAGNOSIS OF LARVA:

Head rounded, not particularly widened through the eyes, often a little longer than wide; antennæ moderate, smooth, with the tuft before the middle. Abdomen with a series of dorsal plates on the sixth to eighth or seventh and eighth segments, which appear only in the last larval stage. Air tube moderately long, smooth, without pecten, a single hair tuft near the middle. Lateral comb of the eighth segment of greatly elongated spines. Anal segment ringed by a chitinous band in the last stage; ventral brush well developed, confined to the barred area. Anal gills generally with the upper pair longer than the lower pair. The skin contains a red pigment.

Tropical and temperate regions of America; Oriental Region.

The generic status of our species of *Orthopodomyia* has been in much confusion, although the genus is really a well-marked one. Theobald placed *signifer*, the species first made known, in *Stegomyia*, being guided by the thoracic ornamentation of the adult. Lutz in 1904 and Dyar in 1905 created new genera for species of this genus. Coquillett, and later Newstead and Thomas, placed one species in *Mansonia*, being deceived by the shape of the wing-scales. Dyar and Knab placed in *Mansonia* all the species found to be congeneric with this species on larval characters, thus completely distorting that genus. The tree-hole inhabiting larvæ treated by them as *Mansonia* belong to *Orthopodomyia*, whereas the larvæ of *Mansonia* in the proper sense live in marshes of permanent water, attached to the roots of aquatic plants. Dyar and Knab adopted the name *Bancroftia* for this genus and we have used it in the earlier part of this work, but Edwards has since shown that *Orthopodomyia* from the Oriental Region is the same and apparently has priority.

The larvæ inhabit water in holes in trees, in broken bamboos and at the leaf-bases of Bromeliaceæ. The eggs of the species best known are laid singly on the sides of the tree-hole at the edge of the water line, sometimes in rows of two or three or even more. Each is covered by a gelatinous, brown, wrinkled membrane, resembling a veil. They hatch in two or three days and the little larvæ descend into the brown water which collects in such tree-holes. The adults are attracted to such water for purposes of oviposition. Similar conditions occasionally obtain in old water barrels or other similar artificial receptacles, and these are, when suitably situated, occasionally inhabited by the *Orthopodomyia* larvæ. The larval development is not particularly rapid. Hibernation apparently occurs in the advanced larval state, in the only species known to occur

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in colder regions. There are, however, several broods in a year, the early larvæ pûpating and emerging normally. The adults inhabit wooded places and have been taken resting on the trunks of trees. The females will bite when given an opportunity, but are not especially troublesome. They are never common, owing no doubt to their peculiar breeding-places, which renders it impossible for them to develop in great numbers. The larvæ are preyed upon by larvæ of species of *Megarhinus,* which probably greatly reduce their numbers. We have never found our northern species so abundant as other tree-hole inhabiting mosquitoes, such as *Aëdes triseriatus* Say, which is often a serious nuisance in wooded places.

The larvæ are peculiar by the absence of the pecten of the air-tube. They are strongly pigmented with crimson; the tracheal tubes are enlarged into bladders in the thorax. In these characters they agree with the larvæ of *Megarhinus.* The peculiar abdominal plates that appear in the last stage are also suggestive of the plates of *Megarhinus,* though not homologous with them.

Tables of the Species.

ADULTS, STRUCTURE AND COLORATION.

1. Thorax without narrow silvery white lines..... 2
   Thorax with narrow silvery white lines..... 3
2. Wing-scales mottled yellow and black..... *fascipes* Coquillett (p. 882)
   Wing-scales dark..... *persephassa* Dyar & Knab (p. 886)
3. Wings with large yellowish costal spots..... *phyllozoa* Dyar & Knab (p. 879)
   Wings with black scales peppered with white..... 4
4. The two posterior thoracic lines beginning close to the second pair of anterior lines..... *signifer* Coquillett (p. 887)
   The two posterior thoracic lines beginning about halfway between the ends of the two anterior pairs of lines..... *waverleyi* Grabham (p. 891)

MALE GENITALIA.

1. Clasp-filament with a row of setae within..... *phyllozoa* Dyar & Knab (p. 881)
   Clasp-filament simple..... 2
2. Unci double, with a small inner piece..... *fascipes* Coquillett (p. 884)
   Unci single, without inner piece..... *signifer* Coquillett (p. 889); *waverleyi* Grabham (p. 892)

Of the following we possess no males: *persephassa* Dyar & Knab.

LARVÆ.

1. Air tube long and slender; lateral comb of the eighth segment with only a few scales in the second row..... *phyllozoa* Dyar & Knab (p. 881)
   Air tube short; lateral comb of the eighth segment of scales in a double row 2
2. Sixth abdominal segment with a large dorsal plate reaching to the middle of the side..... *fascipes* Coquillett (p. 884)
   Sixth abdominal segment with a small dorsal saddle only *signifer* Coquillett (p. 889); *waverleyi* Grabham (p. 892)

The larva of *persephassa* Dyar & Knab is unknown.

ORTHOPODOMYIA PHYLLOZOA (Dyar & Knab).

Mansonia phyllozoa Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 199, 1907.
Mansonia phyllozoa Busck, Smiths. Miss. Colls., quart. iss., iii, 60, 1908.
Mansonia phyllozoa Theobald, Mon. Culic., v, 619, 1910.
Bancroftia phyllozoa Howard, Dyar & Knab, Mosq. No. & Centr. Amer. & W. Ind., ii, pl. 35, fig. 236, pl. 129, fig. 448, 1913.
Bancroftia phyllozoa Picado, Bull. Scient. France et Belg., 7 ser., xlvii, 353, 1913.

ORIGINAL DESCRIPTION OF MANSONIA PHYLLOZOA:

♂.—Proboscis moderately long and stout, slightly swollen towards the apex, black scaled, a yellow-white ring behind the middle; palpi nearly as long as the proboscis, black scaled with two yellow-white rings, the apices brilliantly silver scaled; mesonotum very deep brown with four longitudinal lines of silvery-white scales, two of these lines are marginal and extend the entire length of the meso-

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notum, the other two submedian and begin behind the middle and extend over the scutellum where they unite upon its hind margin; the lateral stripes extend along the sides of the scutellum; metanotum with a median carina, dark brown. Abdomen dark scaled, with lateral patches of whitish scales. Legs with the femora predominatingly yellow scaled, the apices black; tibiae yellowish-white scaled, ringed with black, the rings becoming larger towards the apices, first tarsal joints black, maculate with white; on the hind legs the apices broadly white, the second tarsal joint white at the apex and nearly half its base, the third joint broadly white at the base, minutely at the apex, the fourth more narrowly white at the base, the fifth entirely white-scaled; fore and mid legs narrowly white marked. Wings with the veins mostly black scaled; four conspicuous yellowish-white elongated costal spots one of these basal and very long, the others shorter, all involving the first vein. Length, 3 mm.

One specimen, Tabernilla, Canal Zone, Panama (August Busck, Collector), bred from larvæ in the leaves of Bromelias.

Type.—No. 10864, U. S. National Museum.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF ORTHOPODOMYIA PHYLLOZOA:

Female.—Proboscis moderately long, rather stout, slightly dilated towards apex; vestiture black, a pale yellow spot dorsally beyond middle and another close to apex; labellæ short and broad, pale scaled. Palpi over half the length of the proboscis, slender; vestiture black, with scattered yellowish scales and a yellowish ring behind the middle, apices silvery-white scaled. Antennæ filiform, long, the joints subequal, rugose, black, coarsely pilose; second joint thickened towards apex; tori small, deep brown, pruinose, a patch of small white scales on inner side; hairs of whorls sparse, rather short, black. Clypeus conical, convex, dull chestnut-brown. Occiput clothed broadly with curved, narrowly lanceolate pale yellow scales, ovate yellow ones on the sides with a patch of black ones; margins of eyes silvery-white scaled; cheeks yellowish-white scaled; numerous yellow and black upright forked scales broadly distributed over the nape; a pair of long yellowish bristles projecting between eyes.

Prothoracic lobes small, lateral, not prominent, with some small white scales and a few long pale bristles. Mesonotum rich brown, partly clothed with sparse, minute, narrow, curved brown scales and with dorsal and lateral series of long, coarse black bristles; two submedian narrow bare longitudinal stripes reaching to antescutellar space; at the sides of this space are broad bare areas running forward to beyond the middle and surrounded by lanceolate silver white scales, the outer border of white scales close to lateral margin and continued forward to anterior angles; a marginal line of pale yellow scales from roots of wings to middle. Scutellum with lanceolate silver-white scales in continuation of the four lines on mesonotum, the median pair confluent on distal part of mid lobe; each lobe with a group of long golden bristles. Postnotum elliptical, prominent, yellowish-brown, nude, with a median longitudinal fine ridge and pale yellowish lateral margins. Pleuræ and coxæ dark grayish, bearing dark setæ and a few patches of small, broad whitish scales.

Abdomen subcylindrical, slightly enlarged towards apex, depressed, blunt at tip; dorsal vestiture brownish-black, irregular patches of silver-white scales at lateral margins of segments, particularly on fourth, fifth, and sixth segments; hairs at apices of segments shining yellowish, those on last four segments long, coarse and abundant; first segment with dark scales and many long pale hairs; venter dark-scaled with scattered yellowish ones, particularly towards base.

Wings rather narrow, slightly infuscated; petiole of second marginal cell much shorter than its cell, that of second posterior cell rather shorter than its cell; basal cross-vein distant about twice its length from anterior cross-vein; scales of veins broadly lanceolate, the outstanding ones long and narrow; color dull black, with patches of light yellowish ones, the pale scales arranged in spots as follows: Four elongate costal spots involving costal, subcostal and

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first veins, nearly equidistant, the first spot about one-third the distance from wing-base, the fourth near apex, the second the largest; a long basal line on first vein, reaching close to first costal spot; second vein with a spot at base of fork and at apex of each branch; a spot on second, third, and fourth veins below second costal spot; fourth vein with a spot at base of fork and at apex of each branch; fifth vein with a spot at base of fork, another on the upper branch and at its apex; sixth vein with an apical spot; fringe unspotted. Halteres pale yellowish, the knobs with a few similarly colored scales.

Legs long, rather slender; vestiture black, marked with ocherous yellow and white; tibiæ with numerous large yellow spots, giving a banded effect; femora with ocherous-yellow scales predominating; knees whitish scaled; first tarsals of all the legs with a few irregular spots of yellowish scales; fore tarsi without distinct rings; mid tarsi with bases and apices of first and second joints silver-white ringed, third joint white at base, fourth and fifth dorsally white; hind tarsi with apex of first joint broadly white-ringed, second with base broadly and apex more narrowly white-ringed, apex, base and apex of third, base of fourth and all of fifth joints silvery-white. Claw formula, 0.0–0.0–0.0.

Length: Body 3 mm.; wing 3 mm.

Male.—Proboscis straight, rather slender, slightly dilated towards tip; vestiture black, labellæ silvery, a patch of yellowish scales close to apex and a yellow ring before the middle. Palpi somewhat shorter than the proboscis, very slender, uniform, a few long setæ at apex; vestiture dull black with some scattered pale scales; long joint with yellow rings at base and middle, silvery-white scaled at its apex, the succeeding joint silver-scaled at apex. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, pale, with black rings at insertions of hair-whorls; hairs of whorls long, moderately abundant, brown with yellow silky luster. Coloration as in the female. Abdomen subcylindrical, slightly longer than in the female, the ciliation hardly more abundant. Wings slightly narrower than in the female, the stems of the fork-cells longer. Claw formula, 1.0–1.0–0.0.

Genitalia (plate 35, fig. 236): Side-pieces over twice as long as wide, conically tapered, with a low rounded basal lobe bearing three long stout spines; clasp-filament uniform, moderate, with a row of setæ on inner side and a long articulated terminal spine. Harpes concave, inner margin revolute, tip divided into several teeth. Unci forming a basal cylinder, the tips dentate inwardly.

Larva, Stage IV (plate 129, fig. 448).—Head rounded, broader than long, widest in the region of the eyes. Antennæ rather long, slender, nearly uniform, smooth, the tuft slightly before middle, ample; two of terminal spines long. Dorsal head-hairs and ante-antennal tufts in long multiple tufts, all lying in a curved transverse line. Abdomen with a large quadrate dorsal plate on seventh segment, a long narrow one on eighth segment, reaching well down the sides before the comb; comb of narrow fringed scales in a double row, basal row of many scales, posterior row of three longer ones only. Air-tube long and slender, about eight times as long as wide, tapering outwardly and bearing a single tuft before middle. Anal segment longer than wide, ringed by the plate; dorsal tuft a long hair and tuft on each side; lateral tuft small, four-haired; ventral brush well developed, confined by the chitinous ring; anal gills lanceolate, the lower pair about as long as segment, the upper pair longer.

The larvæ live in the water between the leaves of Bromeliaceæ. Mr. Busck bred the type specimen from a bromeliad, Mr. Jennings met with the larvæ five times in such situations, and Mr. Picado has also bred this species from epiphytic bromeliads.

Panama and Costa Rica.

Tabernilla, Canal Zone, Panama, June 25, 1907 (A. Busck); Fort San Felipe, Porto Bello, Panama, January 21, 1908 (A. H. Jennings); Caldera

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Island, Porto Bello Bay, Panama, January 24, 1908 (A. H. Jennings); Gatun, Canal Zone, Panama, August 11, 1908 (A. H. Jennings); Porto Bello, Panama, February 10, 1909 (A. H. Jennings); Cascajal River, Panama, February 18, 1909 (A. H. Jennings); Orosi, Costa Rica, 1100 meters, November to January (C. Picado).

ORTHOPODOMYIA FASCIPES (Coquillett).

Mansonia fascipes Coquillett, Proc. Ent. Soc. Wash., vii, 182, 1905.
Mansonia fascipes Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 185, 1906.
Mansonia fascipes Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. No. 11, 25, 1906.
Mansonia fascipes Knab, Ent. News, xviii, 153, 1907.
Bancroftia fascipes Dyar & Knab, Ent. News, xxi, 264, 1910.
Mansonia longipalpis Newstead & Thomas, Ann. Trop. Med. & Par., iv, 145, 1910.
Mansonia fascipes Theobald, Mon. Culic., v, 451, 1910.
Thomasina longipalpis Newstead & Carter, Ann. Trop. Med. & Par., iv, 555, 1911.
Bancroftia fascipes Howard, Dyar & Knab, Mosq. No. & Centr. Amer. & W. Ind., i, 53, 73; ii, pl. 36, fig. 239, pl. 129, fig. 447, 1913.

ORIGINAL DESCRIPTION OF MANSONIA FASCIPES:

Distinguished by the coloring of the hind tarsi. Scales of the palpi mixed black and yellow, those on the apex white. Scales of proboscis mixed black and yellow and with several white ones beyond its middle, almost forming a band. Scales of occiput light yellow, those along the sides white, the upright ones chiefly brown. Thorax brown, its scales golden yellow. Abdomen purple-scaled, a patch of pale yellow ones near middle of sides of each segment; venter black-scaled, front angles of the segments whitish-scaled. Femora and tibiae black-scaled and with many patches of light yellow ones, the under side of the hind femora and inner side of their tibiae chiefly yellow-scaled; front and middle tarsi black-scaled, the first joint with many small patches of yellow ones, both ends of the first three joints and the whole of the last two, yellow-scaled; hind tarsi the same except that the third joint is wholly yellowish-scaled; tarsal claws simple. Wings hyaline, the scales black, yellow, and white, the latter collected into about seven spots, several narrow lateral scales on most of the veins. Length 5 mm.

Puntarenas, Costa Rica. Four females collected by Mr. F. Knab.

Type.—No 8296, U. S. National Museum.

ORIGINAL DESCRIPTION OF MANSONIA LONGIPALPIS:

Female. Palpi long. Thorax clothed with golden ochreous scales; posterior region black. Abdomen blackish with lateral patches of creamy-white scales. Legs distinctly speckled; hind tibiae white with a black band. Wings with a double dense black bar at base.

Length 4–4.5 mm. Length of detached wing 5 mm.

Head scales. Upright forked, black; narrow curved, pale ochreous with golden reflections; flat, creamy white.

Palpi. A little more than one-third the length of the proboscis; tips clothed with white scales; the remaining scales mixed creamy white, pale ochreous and blackish.

Proboscis with an incomplete central band of creamy-white scales; the scales on the ventral surface of the pale area black, those on the remaining portion of the proboscis blackish with pale ochreous ones intermixed.

Thorax with golden ochreous scales intermixed with a few black ones in front; those over the insertion of the wings very long and whitish; region in front of the scutellum semi-nude, blackish-brown with a well defined median group of black scales; pleurae clothed with flat (some almost spindle-shaped) creamy white scales.

Abdomen. Blackish with a few creamy-white scales at the base of the segments; and lateral sub-triangular patches of creamy-white. Apical margins of all the segments with a fringe of very long golden brown hairs.

Legs black or brownish-black; conspicuously speckled with bright ochreous yellow; last segment of the anterior tarsi with an inconspicuous band of dull ochreous; *mid tarsi:* apex of 2nd, basal two-thirds and apex of third, and the whole of the 4th and 5th ochreous white; *hind tarsi:* apex of 2nd, the whole of the 3rd, base and apex of the 4th and the whole of the 5th ochreous white.

Wings densely clothed with blackish and creamy white scales; the former predominating; base of costa, sub-costa, and first longitudinal vein, black. Fringe smoky-grey. Outstanding scales more than twice the length of the broad spathuliform ones, and considerably longer than those in *Mansonia titillans.*

The distinguishing features of this insect are the abnormally long palpi, the colour of the hind tarsi and the great length of the outstanding scales of the wing.

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It is a large and very characteristically marked insect, and may from the character of the palpi form the type of a new genus.

Habitat:—Four females, all taken at a large residence at the pumping station standing at a considerable elevation and surrounded by woods and swamps. It is one of the coolest spots in the immediate neighbourhood of Manáos. They were all taken between the hours of 5 and 5.30 p. m. during the month of August, 1906 and 1907.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF ORTHOPODOMYIA FASCIPES:

Female.—Proboscis straight, long, slender, slightly swollen towards tip; vestiture of black semi-erect scales, a few yellowish scales intermixed, two-thirds from base a white patch on upper surface and a fringe of pale scales at base of labellæ. Palpi slender, nearly one-third the length of the proboscis; vestiture of blackish scales with a few yellowish ones intermixed, apices light silver-gray scaled. Antennæ filiform, long and slender, the joints subequal, black, white-ringed at base; hairs of whorls sparse and rather short; tori small, closely approximated, piceous, covered with small broad whitish scales. Clypeus prominent, rather narrow, rounded in front, impressed at the sides, piceous, pruinose, nude. Eyes separated by a narrow crest of whitish scales. Occiput broadly clothed in the middle with pale yellowish recumbent and semi-erect narrow scales, those along ocular margins whitish; there are four patches of erect black scales and an abundance of evenly distributed, dark, erect forked scales; sides of head clothed with broad, flat, dull white scales, a small patch of black ones above at ocular margin; bristles along margins of eyes coarse, black, a pair of long pale ones projecting forward at vertex.

Prothoracic lobes well separated, rather small but prominent, contiguous with back of head, densely clothed with ovate, semi-erect yellowish-white scales and bearing a few coarse, black, very long setæ. Mesonotum blackish, rather densely clothed with large, narrow, curved golden-brown scales; antescutellar space bare, a triangular patch of blackish scales medianly in front of it; a small bare space basally at either side of antescutellar space; a small bare spot medianly on sides of disk; a short stripe of long semi-erect white scales at either side of antescutellar space, indistinct median and sublateral stripes and lateral patches of irregular dull whitish scales, giving an irregularly mottled appearance; setæ coarse and moderately long. Scutellum clothed with long narrow white scales, each lobe with a group of coarse and moderately long, brown setæ. Postnotum prominent, elongate, nude, with a fine median ridge, deep brown, anterior angles pale. Pleuræ and coxæ piceous, clothed with elliptical flat yellowish-white scales and with rather coarse, dark setæ.

Abdomen rather stout, subcylindrical, blunt at apex; cerci slender and prominent; dorsal vestiture of blackish scales and scattered dull yellowish scales, mostly at apical margins of segments, with large irregular lateral patches of white scales medianly on each segment; first segment short, clothed with blackish scales and with many fine brown hairs; venter with the basal segments white scaled, the succeeding ones dark scaled with white basal bands.

Wings rather narrow, membrane smoky-tinged particularly on anterior portion; second marginal cell about twice as long as its petiole; base of second posterior cell in line with second marginal cell; basal cross-vein very close to anterior cross-vein; veins clothed mostly with very broad subtruncate scales, dull blackish with a few yellowish ones intermixed and with patches of whitish scales arranged as follows: A costal spot at extreme base of wing and a transverse white patch a short distance beyond, extending across all the veins; on first vein two white patches near each other, about one-third from wing-base; about two-thirds from base a yellow costal patch involving first vein and preceded and followed by a mottling of yellow scales; at apex of wing a whitish patch involving first and upper branch of second vein; bases of second marginal and

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second posterior cells with a white patch; at cross-veins a transverse bar of white extending across the second, third, fourth, and upper branch of fifth veins; fifth vein with a large white patch at base of fork. Halteres pale, with dark, minutely scaled knobs.

Legs long and rather slender; vestiture black with numerous ocher-yellow irregular spots and fasciæ on femora, tibiæ and first tarsal joints; hind femora basally pale beneath and on inner side; front and middle femora with a yellowish ring towards apices; knees broadly yellow; tips of front and middle tibiæ yellow; front tarsi with base of first and tip of second joints narrowly yellow, and all of third, fourth and fifth joints dorsally yellow; middle tarsi with bases and apices of first, second and third, and all of fourth and fifth segments yellow-white with a silver luster; hind tarsi with apex of second and all of third and fifth segments brilliant yellowish-white, the fourth broadly black-ringed in the middle; femora with scales erect at apices, giving an effect of tufting, most distinct on middle pair. Claw formula, 0.0–0.0–0.0.

Length: Body 4.5 to 5 mm.; wing 4.5 to 5 mm.

Male.—Proboscis long and moderately slender, straight, somewhat swollen towards tip; vestiture of black and scattered ochraceous scales, base of labellæ with shining whitish scales. Palpi long, nearly attaining tip of proboscis, straight, very slender, but slightly enlarged towards tips; terminal segment small and slender; vestiture ocher-yellow and black intermixed, the black scales predominating on terminal segments, the yellow ones on long joint; tips of segments narrowly white scaled and the long segment with a median white ring. Antennæ sparsely plumose, long and rather stout, ringed, slightly longer than the proboscis, the segments nearly cylindrical and unusually elongate for a male mosquito, white with broad black rings; last two segments slender and very long; hairs of whorls long, black; tori rather small but prominent, black, covered with whitish scales. Front of head above antennæ transversely protuberant, bright yellow with two small brown spots. Clypeus prominent, narrow, conical, dark brown, apex pale. Coloration similar to the female. Abdomen more elongate than in the female, subcylindrical, depressed; dorsally with a double series of basal segmental dull yellowish triangular patches; apical segments with short, sparse and rather coarse lateral ciliation. Wings narrower than those of the female, vestiture the same, the stems of the fork-cells longer. Legs longer than those of the female. Claw formula, 1.0–1.0–0.0.

Length: Body 4.5 to 5.5 mm.; wing 4 to 5 mm.

Genitalia (plate 36, fig. 239): Side-pieces over twice as long as broad, uniform, tips rounded; a large rounded basal lobe bearing three stout spines and two long setæ besides a coating of small hairs. Clasp-filament long and slender, slightly enlarged at base, a long articulated subterminal spine. Harpes elliptical concave, margins revolute, apex bearing three teeth. Harpagones wanting. Unci plate-like, with curled tips.

Larva, Stage IV (plate 129, fig. 447).—Head rounded, subquadrate, nearly straight on the sides, front margin broadly arcuate. Antennæ moderate, cylindrical, swollen near base and tapering outwardly, smooth; a large tuft at basal third; at tip two rather long spines, two short ones and a digit on a pedicel. Mental plate triangular, with a large central tooth and ten on each side, three basal ones large and distant. Mandible quadrangular; two large filaments and a small one before tip; an outer row of cilia from a collar; a row of small filaments along outer margin; dentition of four small teeth on a slender process; a long serrate filament and row of stout hairs within, a long tooth at base; process below slender, furcate, lower limb much the longer, a tuft of hair at tip of each limb and a row along front margin; basal angle small; two hairs within and four at base. Maxilla elongate, conical, divided by a suture; inner

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half with long stout hairs along margin and two straight rows of cilia within; a tuft of hairs at tip continued along the suture; outer half with a small filament next the suture and a long subapical spine; palpus long and slender, nearly as long as maxilla, with four slender digits. Thorax rounded, wider than long; hairs abundant. Abdomen rather slender, the anterior segments shorter; a dorsal chitinous plate on sixth segment; a very large one on the seventh segment covering the dorsum and extending well down the sides; a plate on eighth segment, excavated before air-tube and extending down the sides before comb. Tube moderate, slightly tapered, more than three times as long as wide; no pecten, but a large tuft before middle. Lateral comb of eighth segment a double row of long scales; single scale elliptical at base, fringed with small spinules, tip expanded into a smooth elliptical appendix. Anal segment about as long as wide, ringed by the plate; dorsal tuft a long hair and brush on each side; a single lateral hair; ventral brush well developed, dense, confined to barred area; anal gills long, the upper pair over twice as long as segment, the lower pair shorter, bluntly tapered.

Adults of both sexes were taken by Mr. Knab at Rio Aranjuez near Puntarenas, Costa Rica, September 13, 1905. His notes say:

"Pathway to Las Loras. In a place where there were some very large trees and the ground covered with herbage and low shrubbery. Upon low bushes a couple of male *Megarhinus* were discovered and easily captured. A search for breeding-places was without success. In this search some mosquitoes were disturbed from their hiding-place, a crevice in the trunk of a large tree. They alighted upon the bark close by and were easily captured. About ten feet up was a hollow which had recently contained water. The females had greatly distended abdomens."

Mr. F. W. Urich captured specimens in Trinidad, British West Indies, and afterward obtained the larvæ in water in open bamboo-joints. He says:

"The predominating colour of these larvæ is red; when young the pigment is pale on the dorsal anterior half of each segment of thorax and abdomen and gets lighter, until a white ring is formed at the joint with the next segment, thus giving the larva a red and white ringed appearance. This coloration is maintained right through all stages of the larva. At each change of skin the red color gets more intense, until the mature larva has a rather dark appearance. The pupa also has a reddish tint showing through the brown coloration. The larvæ live in bamboo joints, the water in which teems with infusoria, small worms and other micro-organisms. It would appear as if this fauna is essential to their well-being, for if isolated too young they die or do not mature well. The larval period seems to take a long time."

Mr. Jennings twice obtained the larvæ in bamboo-traps.

In every case our larvæ were taken in open bamboo joints, but Mr. Knab captured his adults where there was no bamboo in the vicinity, so it is probable that the larvæ also inhabit water in tree-holes. They feed upon small organisms or organic matter contained in the water. The adults pass the dry season hiding in crevices in the bark. They rest upon the trunks of trees, where their mottled colors and spotted wings render them very inconspicuous. The eggs have not been observed, nor the mating habits of the adults. None of our correspondents report having been bitten by this species. It probably attacks only at night and in the forest.

Tropical America, in forested regions.

Rio Aranjuez, Costa Rica, September 13, 1905 (F. Knab); Tabernilla, Canal Zone, Panama, July 24, August 14, 1908 (A. H. Jennings); Omai, British Guiana (K. S. Wise); St. Anns Valley, Trinidad, November 18, 1905 (F. W. Urich). Reported also from Manaos, Brazil (Newstead & Thomas).

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Orthopodomyia fascipes was described in the wrong genus, the author having been deceived by the shape of the wing-scales. This error led to much confusion, to which we have already referred under our discussion of the genus. Newstead and Thomas redescribed the species, also as a *Mansonia,* evidently being unacquainted with Coquillett's description published five years earlier. Later Newstead and Carter needlessly established the genus *Thomasina* for this species.

Our specimens show great variation in the tarsal ornamentation. Some specimens have the last three tarsal joints of all the legs wholly yellowish white scaled and the preceding joints more extensively pale scaled. Others show more or less extensive black rings or spottings on the third joint of front and middle tarsi; where these joints are heavily marked with black, the fourth joint of the hind tarsi usually bears a black median ring; the extreme is reached in specimens which have in addition a narrow black subapical ring on the third joint of the hind tarsi. The irregular spottings of the legs are also subject to considerable variation. On the front and middle tarsi the markings on the distal joints are usually somewhat obscured by a submetallic luster. There seems to be little tendency to the formation of local races, as our small series from different localities show much the same range of variation.

ORTHOPODOMYIA PERSEPHASSA (Dyar & Knab).

Bancroftia persephassa Pazos (non desc.), Anal. Acad. Cien. med., fis. y nat. de la Habana, xlv, 431, 1908.
Bancroftia persephassa Dyar & Knab, Smiths. Misc. Colls., quart. iss., iii, 254, 1909.
Bancroftia persephassa Pazos, San. y Benef., ii, 46, 187, 1909.

ORIGINAL DESCRIPTION OF BANCROFTIA PERSEPHASSA:

Female.—Proboscis black-scaled, a white ring at the middle. Thorax clothed with narrow golden scales, with a subdorsal narrow bare line on either side, the sides of the disk dark except for a patch of golden scales over the root of the wing. Abdomen subcylindrical, truncate at tip, black-scaled above with yellowish white lateral basal segmental spots, venter black, with narrow white basal bands. Wings hyaline, the scales dusky black, the outstanding ones broad, obliquely subtruncate at the tip. Legs black-scaled, the femora with the apices yellowish white and a ring of this color at the apical third; tibiæ similarly marked; tarsi of the hind legs ringed with white at both ends of the joints, the last joint black at the tip; front and mid tarsi with the markings similar, but obsolete on the last three joints. Length, 3.5 mm.

One specimen, San Antonio de los Baños, Cuba (J. H. Pazos).
Type no. 12118, U. S. N. M.

DESCRIPTION OF FEMALE OF ORTHOPODOMYIA PERSEPHASSA (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderately long and slender, uniform; vestiture black, a broad white ring beyond middle; setæ minute, curved, black, those on labellæ more prominently outstanding and pale yellowish. Palpi short, about one-fifth the length of the proboscis, black-scaled, tips white scaled, with rather numerous black bristles and shorter cilia. Clypeus rounded triangular, prominent, black, nude. Antennæ filiform, moderate, the joints subequal, rugose, pilose, black; hairs of whorls sparse, moderate, black; tori small, subspherical, with a cup-shaped apical excavation, brownish luteous, a large patch of yellowish scales on inner side. Eyes black. Occiput dark brown, clothed with narrow, curved golden-yellow scales, margin of eyes and lower part of sides with flat whitish scales; many erect forked black scales on the nape, a broad median area on vertex with very broad, erect, golden yellow ones; bristles along margins of eyes coarse and long, brown, a tuft of long yellow ones prejecting forward between the eyes.

Prothoracic lobes elliptical, remote dorsally, small but prominent, clothed with broad whitish scales and black bristles. Mesonotum deep brown, with two narrow, bare longitudinal stripes medianly on anterior half and a broad one

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on each side of antescutellar space extending from base to well beyond middle; vestiture of rather coarse, narrow, curved golden-yellow scales, forming three broad stripes on anterior part of disk and becoming fused before and about antescutellar space; a short stripe of golden scales over roots of wings; lateral margins and anterior angles with golden scales; bristles long, coarse, abundant, black with bronzy luster. Scutellum trilobate, with a patch of very narrow pale golden scales on mid lobe, each lobe with a group of coarse brown bristles. Postnotum elliptical, prominent, dark brown, slightly pruinose, nude. Pleuræ luteous brown spotted with black, with patches of large elliptical creamy-white scales and rows of brown bristles; coxæ similar, without the black markings.

Abdomen subcylindrical, blunt at tip; dorsal vestiture of black scales, laterally with large, subquadrate, basal segmental white spots; first segment black scaled, with many fine, long pale hairs; venter yellowish scaled, with broad apical segmental black bands; apices of segments with coarse yellow hairs.

Wings rather broad, hyaline; petiole of second marginal cell two-fifths the length of cell, that of second posterior shorter than its cell; basal cross-vein more than its own length distant from anterior cross-vein; scales of veins brownish-black, large, broad and dense, covering most of the membrane, the outstanding ones broad, obliquely subtruncate, more or less overlapping.

Legs rather long, moderately slender; vestiture black with white rings; femora with a white ring at apical third; knees white-scaled; fore tibiæ with a white spot before apical third; mid and hind tibiæ with a white ring before apical third; tips of tibiæ broadly white; front and mid tarsi narrowly white marked at bases and apices of first and second joints, third and fourth joints marked at base only, fifth entirely black-scaled; hind tarsi more broadly white ringed on both ends of all the joints but the last, which is narrowly white at base only. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3.2 mm.

Life history and habits unknown.

Cuba.

San Antonio de los Baños (J. H. Pazos).

Only the single type specimen has been collected.

ORTHOPODOMYIA SIGNIFER (Coquillett).

Culex signifer Coquillett, Can. Ent., xxviii, 43, 1896.
Culex signifer Giles, Handb. Gnats or Mosq., 268, 1900.
Culex signifer Coquillett, U. S. Dept. Agr., Div. Ent., Circ. 40, 6, 1900.
Culex signifer Howard, U. S. Dept. Agr., Div. Ent., Bull. 25, n. s., 20, 1900.
Stegomyia signifer Theobald, Mon. Culic., i, 322, 1901.
Stegomyia signifer Howard, Mosquitoes, 155, 1901.
Stegomyia signifera Howard, Mosquitoes, 236, 1901.
Stegomyia signifera Smith, Ent. News, xiii, 299, pl. xiii, f. 1, 1902.
Stegomyia (?) *signifer* Giles, Handb. Gnats or Mosq., 2 ed., 379, 1902.
Culex signifer Dyar, Journ. N. Y. Ent. Soc., xi, 26, 1903.
Stegomyia signifer Theobald, Journ. Trop. Med., vi, 238, 1903.
Culex signifer Smith, N. J. Agr. Exp. Sta., Bull. 171, 38, 1904.
Culex signifer Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 255, 1905.
Stegomyia signifer Felt, Bull. 79, N. Y. State Mus., 338, 391*d*, 1904.
Stegomyia signifera Blanchard, Les Moustiques, 258, 1905.
Pneumaculex signifer Dyar, Proc. Ent. Soc. Wash., vii, 46, 1905.
Pneumaculex signifer Dyar, Journ. N. Y. Ent. Soc., xiii, 54, 108, 1905.
Pneumaculex signifer Felt, Bull. 97, N. Y. State Mus., 490, 1905.
Culex (?) *signifer* Ludlow, Med. Record, N. Y., lxix, 97, 1906.
Mansonia signifer Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 185, 1906.
Pneumaculex signifer Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. No. 11, 26, 1906.
Pneumaculex signifer Dyar, U. S. Dept. Agr., Bur. Ent., Circ. 72, 3, 1906.
Mansonia signifer Knab, Ent. News, xviii, 153, 1907.
Mansonia signifer Dyar, Proc. U. S. Nat. Mus., xxxii, 128, 1907.

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Pneumaculex signifer Theobald, Mon. Culic., iv, 524, 1907.
Culex (pneumaculex) signifer Viereck, 1st Ann. Rept. Comm. Health Pa., 470, 1908.
Bancroftia signifer Thibault, Proc. Ent. Soc. Wash., xii, 20, 1910.
Pneumaculex signifer Theobald, Mon. Culic., v, 469, 1910.
Aëdes signifer Morse, Ann. Rept. N. J. State Mus., 1909, 719, 1910.
Bancroftia signifer Howard, Dyar & Knab, Mosq. No. & Centr. Amer. & W. Ind., i, 120, 143, 151, 154; ii, pl. 36, fig. 238, pls. 80, 81, pl. 145, fig. 669, pl. 149, fig. 707, 1913.

ORIGINAL DESCRIPTION OF CULEX SIGNIFER:

♀. Head velvet black, its tomentum silvery-white, the pile black; antennae, proboscis and palpi black, their tomentum mixed brown and silvery-white, that on apices of palpi wholly silvery. Thorax velvety brownish-black, marked on the anterior half with two silvery-white subdorsal vittæ, and with a silvery white arcuate lateral line extending the entire length of the thorax; pleura marked with several spots of silvery-white tomentum; scutellum with two spots of similar tomentum on the upper side and one at the tip. Abdomen black, its tomentum violaceous, that at base of each segment white. Legs brown, femora largely yellowish, the tomentum mixed brown and silvery-white, that at apices of tibiae pure white, each end of tarsal joints white, most extended on the hind tarsi; tarsal claws destitute of teeth on the under side. Wings hyaline, veins yellowish, the scales mixed brown and white; length, 4.8 mm.

District of Columbia. A single specimen, captured by the writer in June.

Near *fasciatus*, Fabr., but the lateral silvery line on the thorax is not strongly bent inward at the middle, and the tarsal claws are not toothed.

DESCRIPTION OF FEMALE, MALE, LARVA, PUPA, AND EGG OF ORTHOPODOMYIA SIGNIFER:

Female.—Proboscis straight, rather long, slightly enlarged at tip, clothed with bronzy-black suberect scales with many milky white ones dorsally tending to form longitudinal striæ. Palpi elongate, more than one-third the length of the proboscis, slender, very slightly enlarged at apex; terminal segments with scattered long setæ; vestiture of deep brown scales with a heavy sprinkling of white ones, apices silver scaled. Antennæ filiform, rather long, the joints subequal, coarsely ciliate, second to fifth with a row of white scales along inner side; hairs of whorls sparse, moderate, brown; tori rather small, dark brown, with an oblique ridge of erect white scales. Clypeus short, convex, broad at base, conical, blackish-brown, nude. Eyes separated by a narrow ridge of white scales. Occiput blackish-brown with recumbent, narrow curved white scales and with numerous long, very slender, erect, forked deep brown ones; ocular margins and cheeks silvery-white scales; bristles along margins of eyes long and coarse, black, some longer black ones projecting between the eyes.

Prothoracic lobes small, well separated, prominent, contiguous with head; an oblique row of white scales crosses them and they bear a number of very coarse and long black bristles. Mesonotum very deep brown, thinly clothed with minute, narrow, curved, bright reddish-brown scales and with six very narrow longitudinal lines of larger and broader white scales; two of these lines are subdorsal and extend over anterior three-fourths of mesonotum; two are submarginal and extend the entire length of mesonotum; midway between the subdorsal and the submarginal stripes are short stripes extending from the middle to a point opposite the anterior angles of the antescutellar space, at which point they are slightly interrupted, and converging posteriorly, continued by longer suberect white scales, continuing over the scutellum where some very long white scales stand out behind more than the entire length of the scutellum; hairs abundant, coarse and very long, black. Scutellum large, median lobe prominent and broadly rounded; besides the two lines of white scales above mentioned there are patches of white scales at the outer angles; three groups of coarse long brown setæ. Postnotum prominent, elongate, with a small median longitudinal ridge, brown, slightly pruinose, nude. Pleurae and coxæ deep brown and luteous, clothed in part with broad white scales.

Abdomen subcylindrical, slightly enlarged at middle, apex blunt; cerci slender, protruding; dorsal vestiture dull black, with basal triangular patches

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of white scales on lateral margins of segments; second segment with a median basal triangular white patch; first segment white scaled and with many long, fine pale hairs; venter white scaled, with apical segmental black bands becoming successively broader towards tip; lateral cilia and those on hind margins of segments coarse and rather long, black.

Wings moderate, hyaline; scales of veins large and abundant, clavate, partly narrow and partly broad; color of scales mostly dusky brown, white scales intermixed; bases of first and auxiliary vein heavily white scaled for a short distance; sixth vein white scaled from base nearly to its middle; a white transverse patch in the region of the cross-veins extending across second, third, and fourth veins and upper branch of fifth; second marginal cell long, nearly twice as long as its petiole; base of second posterior cell in line with base of second marginal cell; basal cross-vein about its own length behind anterior cross-vein. Halteres pale, the knobs large and with white scales.

Legs long and rather slender; vestiture dark-brown and white; femora and tibiæ with scattered white scales; knees and the apices of middle and hind tibiæ white; middle and hind tarsi white marked; on the middle tarsi the base and apex of the first joint and the base of the second are narrowly white ringed; hind tarsi with fifth segment entirely white above, the others white at bases and apices, very broadly on first segment, narrowest on fourth segment. Claw formula, 0.0–0.0–0.0.

Length: Body 3.5 to 4 mm.; wing 3.5 to 4.5 mm.

Male.—Proboscis straight, moderately long, rather stout, thickened towards apex. Palpi long and very slender, straight, slightly exceeding the proboscis in length, end of long joint and the following joint somewhat thickened and with scattered moderately long bristles, densest about apex; vestiture dull brown with numerous white scales intermixed, tending to form longitudinal lines on long joint, a white ring at base of following joint. Antennæ densely plumose, rather long, last two joints long and slender, the others short, but longer than usual in males, stout, subcylindrical, white with broad dark rings at insertions of hair-whorls; hairs of whorls rather long, with a yellow-brown silky luster; tori large, black, shining, with an oblique crest of white scales above. Abdomen long, depressed, dorsal vestiture mostly of dusky black scales; second segment with basal two-thirds white scaled; third segment broadly white banded at base; succeeding segments with large lateral basal patches which are joined by a basal band of dirty-whitish scales; venter mostly dull white scaled; lateral ciliation coarse, moderately long and abundant, irregular, brown. Wings narrower than those of female, venation and vestiture nearly the same; the white patch near middle of wing less conspicuous than in the female, sometimes almost obsolete. Claw formula, 1.0–1.0–0.0.

Length: Body 3 to 4 mm.; wing 3 to 3.5 mm.

Genitalia (plate 36, fig. 238): Side-pieces over twice as long as wide, tips conically tapered; a large rounded basal lobe bearing three stout spines besides a covering of short hairs. Clasp-filament long and slender, slightly enlarged basally and apically, bearing a terminally inserted, distally broadened spine. Harpes concave, elliptical; margins, especially at tip, revolute, a crown of three spines at apex. Harpagones wanting. Unci plate-like, revolute, tips narrow and curved.

Larva, Stage IV (see the figures of the entire larva, stages III and IV, plates 80 and 81).—Head rounded subquadrate, nearly straight on the sides, front margin broadly arcuate. Antennæ moderate, subcylindrical, swollen at base, distinctly tapering, sharply narrowed at basal third at origin of tuft, which is of about six feathered hairs; shaft smooth; two longer terminal hairs, two short ones, and a small digit. Eyes small, rounded. Both pairs of dorsal head-tufts multiple and long; ante-antennal tuft multiple but short. Mental plate

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rather acutely triangular, central tooth prominent and stout; eight teeth on each side, first five small and crowded, last three large and remote. Mandible quadrangular, produced in the direction of the dentition, nearly smooth without; two long, smooth filaments near apex; an outer row of cilia; a row of long sparse cilia on outer edge arising from shingle-like ridges; dentition of three long spine-like teeth, nearly separate, sessile, with a group of filamentous spines at base and setæ within; process below oblique, a round lump near tip bearing setæ; two setæ within, nearly in line with the subapical cilia; four long hairs at base. Maxilla elongate ellipsoidal, truncate at base, divided by a band-shaped suture; inner half hairy; a crown of hairs at tip with some feathered ones; outer half with two digits on one side and a spine on the other; palpus twice as long as wide, with four digits of different lengths rather well developed. Thorax rounded, wider than long; hairs abundant, the long single ones much longer than width of thorax; subdorsal prothoracic tufts multiple. Abdomen rather slender, anterior segments shorter; lateral tufts of first two segments multiple, very short; a very long lateral hair on third to sixth segments and a shorter one on seventh; long subdorsal hairs on fourth and fifth segments and shorter ones on sixth; a small dorsal chitinous plate on sixth segment; a very large one on seventh segment covering most of dorsal aspect; a transverse plate on eighth segment, excavated before the air-tube. Tracheal tubes narrow, flexuous, expanded into large bladders in posterior half of thorax. Air-tube small, slightly tapered, about three and a half times as long as wide; no pecten, but a large tuft before middle. Lateral comb of eighth segment a double row of long bars, anterior row of twenty-two scales in a straight line, diminishing to minute ones at lower end, posterior row of six much larger scales; single scale of anterior row with a long tip, feathered down the sides; of posterior row much stouter, produced into a bar, the feathering at base only. Anal segment about as long as wide, obliquely terminated, ringed by the plate; dorsal tuft a long hair and brush on each side; a single lateral hair; ventral brush well developed, confined to barred area; anal gills short, about as long as segment, broad, tapered to a point.

Pupa (plate 149, fig. 707).—Cephalothoracic mass ovate, with small tufts anteriorly on the dorsum; air-tubes slender, slightly notched at tip. Abdomen moderate, hair-tufts numerous but not long; a small multiple tuft on apical angles of eighth segment; anal paddles elongate-ovate, with a minute multiple tuft at tip.

Egg (plate 145, fig. 669).—Subcylindrical, the ends bluntly rounded, very slightly tapered toward one end; color black; sculpture of longitudinally elongated hexagons; egg covered with a gelatinous membrane which overlaps considerably on either side and forms a means of attachment, this overlapping portion with many transverse ridges.

The eggs are laid singly, on their sides, close to the water-line on the side of the cavity containing the water. This is normally a hole in the trunk of a tree, though water barrels and similar receptacles are occasionally made use of. Dr. Dyar had some water, taken from a tree-hole, standing in the laboratory in a glass vessel. Apparently during the night eggs were deposited on the glass at the edge of the water-film by a mosquito that had entered the room. These eggs were placed vertically in twos, threes, or singly, attached by their sides, each covered with a wrinkled, veil-like membrane. They hatched in three days and the larvæ descended into the water. The first larval stages were rapidly passed, but the development as a whole was not rapid. The larvæ pupated and emerged normally. Several broods no doubt succeed each other through the year. The winter is apparently passed in hibernation as mature larva. Mr. Busck brought larvæ from St. Louis, Missouri, that he had collected late in the season in a water barrel. The specimens did not pupate while kept in the

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laboratory and were apparently hibernating. All were devoured by a *Megarhinus* that was with them, so the experiment was incomplete. The adults have been taken about the grounds of the Department of Agriculture in Washington, District of Columbia, resting on the trunks of trees, where their gray mottled color renders them inconspicuous. We have no records of the species biting. There are no observations on the mating habits.

Atlantic United States from New Jersey southward and westward to the Mississippi Valley.

New Brunswick, New Jersey (J. B. Smith); Washington, District of Columbia (Coquillett, Barber, Warner, Dyar); Woodstock and Bluemont, Virginia, July 27, 1906 (F. C. Pratt); St. Elmo, Virginia (F. C. Pratt); Plummer's Island, Maryland (D. H. Clemons); Cabin John, Maryland, October, 1908 (F. Knab); Columbia, South Carolina, August 1, 1906 (A. C. Moore); Atlanta, Georgia (W. B. Summerall); 2 miles west of St. Louis, Missouri, October, 1902 (A. Busck); Scott, Pulaski County, Arkansas, August 24, 1909 (J. K. Thibault, Jr.); Fort Sill, Indian Territory (through C. S. Ludlow); Dallas, Texas, April 17, 1906 (F. C. Pratt). Reported also from California (C. S. Ludlow).

Orthopodomyia signifer bears a superficial resemblance to *Aëdes calopus*, which has caused it to be placed in the genus *Stegomyia;* it is, however, structurally very distinct. We quote the California locality cited by Dr. Ludlow with doubt, as no other specimens have been received or reported from west of the Plains.

ORTHOPODOMYIA WAVERLEYI (Grabham).

Mansonia waverleyi Grabham, Can. Ent., xxxix, 25, 1907.
Pneumaculex waverleyi Theobald, Mon. Culic., v, 619, 1910.
Bancroftia waverleyi Howard, Dyar & Knab, Mosq. No. & Centr. Amer. & W. Ind., ii, pl. 35, fig. 237, pl. 129, fig. 449, 1913.

ORIGINAL DESCRIPTION OF MANSONIA WAVERLEYI:

Close to *M. signifer*, Coq., but with an additional curved line of white scales on each side of the mesothorax. This line is usually somewhat broken. I am likewise indebted to Dr. Dyar for examining the larvæ and adults of this species; he writes that the larvæ also differ in the arrangement of the abdominal plates. The larvæ were collected from thick coffee-like water found in hollow mango trees at Waverley Estate, Constant Spring, Jamaica. They are grayish-white in colour, and appear to be peculiarly inactive, lying at the bottom of the jar for long intervals. The pupa stage lasted five days. Length of adult 5.5 mm.

DESCRIPTION OF MALE AND LARVA OF ORTHOPODOMYIA WAVERLEYI (FEMALE UNKNOWN):

Male.—Proboscis straight, rather long, somewhat enlarged towards tip, vestiture very deep brown with irregular white scales at the sides forming rough lines; labellæ silver gray. Palpi very nearly as long as the proboscis, slender and straight, the apex of the long joint and the succeeding joint very slightly thickened; vestiture deep brown, with a sprinkling of white scales; a pale ring near middle of long joint and base of succeeding joint ringed with silver white; tips of palpi silver-white scaled; distal segments and apex of long joint with scattered coarse black bristles. Antennæ densely plumose; last two joints long and slender, the others short but longer than usual in males, stout, subequal, white, with dark rings at insertion of hair-whorls; second segment with outstanding white scales; hairs of whorls long, with yellow-brown silky luster; tori dark brown and with a line of white scales. Clypeus large and prominent, subconical. Occiput with white, lanceolate, curved, recumbent and semi-erect scales and with numerous long black erect forked scales scattered over the entire surface; ocular margins brilliant white; bristles along margins of eyes coarse, black.

Prothoracic lobes lateral, prominent, contiguous with head, and with a number of very coarse and long black bristles; an oblique row of white scales crossing them. Mesonotum deep brown, very thinly clothed with minute curved

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blackish scales and with six very narrow rows of larger, narrowly lanceolate, brilliant white scales, almost identical in arrangement with those of *Orthopodomyia signifer;* two of the rows are subdorsal and extend over the anterior three-fourths of mesonotum; two are submarginal and extend the entire length of the mesonotum; halfway between the subdorsal and submarginal stripes are short stripes extending from middle of mesonotum to a point opposite anterior angles of antescutellar space; halfway between the posterior ends of the two pairs of discal stripes begins a pair of posteriorly converging lines of long suberect white scales, continued over the scutellum where some very long white scales extend out behind more than the entire length of the scutellum; bristles coarse and long, black. Scutellum large, median lobe prominent and broadly rounded, with three groups of long black setæ; beside the two lines of white scales above described there are patches of white scales on the outer lobes. Postnotum prominent, elliptical, with indication of a median ridge, nude, brown. Pleuræ and coxæ dark brown and luteous, clothed with elliptical white scales and with dark setæ.

Abdomen subcylindrical; dorsal vestiture dull-black; anterior angles of segments broadly white scaled; first segment mostly dull-white scaled; venter dark scaled; lateral cilia and those on hind margins of segments long and rather coarse, but scattered, pale brown.

Wings rather narrow, hyaline; scales of veins broadly clavate, mostly dusky brown, with some white ones intermixed, these latter showing a tendency to form groups and patches; a white patch in the region of the cross-veins, extending over second, third, and fourth veins and upper branch of fifth; at the base the first vein is heavily white scaled for a short distance; sixth vein white scaled on its basal half; there are no narrow scales like those present in *O. signifer;* second marginal cell long, about twice as long as its petiole; posterior cross-vein more than its own length behind anterior cross-vein. Halteres large, pale, with white scales on the knobs.

Legs long and rather slender; vestiture blackish-brown marked with white; femora and tibiæ with scattered white scales; knees narrowly and apices of middle and hind tibiæ silver-white scaled; anterior tarsi unicolorous, middle and posterior ones white marked; middle tarsi with first segment rather narrowly ringed with white at base and apex and with scattered white scales, second segment with a few white scales dorsally at base and apex; hind tarsi with first and second segments broadly white ringed at bases and apices, third with narrow rings at base and apex; fourth and fifth segments with small silver-white dorsal patches of scales at bases and apices. Claw formula, 1.0–1.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Genitalia (plate 35, fig. 237): Side-pieces over twice as long as wide, conically tapered, with a low rounded basal lobe bearing three long stout setæ; clasp-filament moderate uniform, smooth, with an articulated terminal claw. Harpes concave, inner margin revolute and thickened, tip dentate. Unci forming a basal cylinder, tips inwardly dentate.

Larva, Stage IV (plate 129, fig. 449).—Head elliptical, longer than wide, rounded, not widened through eyes; antennæ moderate, subcylindrical, smooth, the tuft before the middle; both pairs of dorsal head-hairs multiple and long, ante-antennal tufts multiple but shorter, tufts set nearly in a transverse line. Abdomen with a dorsal plate on seventh segment and a large one on eighth, reaching well down towards venter. Lateral comb of eighth segment of long scales in two rows, overlapping; scales in distal row few and much longer than in proximal row; single scale with body fringed, tip drawn out as long as body of spine. Air-tube about three times as long as wide, tapered on outer half, a single tuft before middle arising from a slight notch. Anal segment a little longer than wide, ringed by the plate; dorsal tuft a long hair and tuft on each side; lateral hairs single, small; ventral brush short but dense, confined to barred area; anal gills very short, rounded, upper pair twice as long as lower.

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Dr. Grabham found the larvæ in a hollow tree.

Jamaica.

Waverley Estate, September 1, 1906 (M. Grabham).

The drawing of larval details has been made from alcoholic larvæ sent by Dr. Grabham; they are in immature condition, the abdominal plates not having fully developed. It is probable that in fully mature larvæ they are the same as in the larva of *Orthopodomyia signifer*, to which this species is very closely allied.

Genus AËDEOMYIA Theobald.

Aëdes **Lynch Arribálzaga (not Meigen), El Nat. Argent., i, 151, 1878.**
Aëdes **Lynch Arribálzaga (not Meigen), Rev. Mus. de La Plata, i, 375, ii, 161, 1891.**
Aëdeomyia **Theobald, Journ. Trop. Med., iv, 235, 1901 (without species).**
Aëdeomyia **Theobald, Mon. Culic., ii, 218, 1901.**
Ædomyia **Giles, Gnats or Mosq., 2 ed., 475, 478, 1902.**
Aëdeomyia **Neveu-Lemaire (in part), Mém. Soc. Zool. France, xv, 222, 1902.**
Aëdeomyia **Neveu-Lemaire, C. R. Soc. Biol. Paris, liv, 1331, 1902.**
Aëdeomyia **Lutz in Bourroul, Mosq. do Brasil, 54, 1904.**
Aëdeomyia **Lahille, Actas y Trab. 2 Congr. Med. Latino-Amer., ii, 18, 1904.**
Aëdeomyia **Blanchard (in part), Les Moustiques, 403, 1905.**
Aëdeomyia **Theobald (in part), Gen. Ins., Dipt., 26 fasc., 34, 35, 1905.**
Aëdeomyia **Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 16, 1906.**
Ædeomyia **Dyar & Knab, Can. Ent. xxxix, 48, 1907.**
Ædeomyia **Autran, Anal. Dep. Nac. Hig., xiv, 28, 1907.**
Aëdeomyia **Peryassú (in part), Os Culicid. do Brazil, 36, 249, 1908.**
Aëdomyia **Williston, Man. No. Am. Dipt., 3 ed., 107, 1908.**
Aëdeomyia **Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 180, 181, 1908.**
Aëdeomyia **Pazos, San. y Benef., ii, 40, 43, 1909.**
Aëdeomyia **Theobald (in part), Mon. Culic., v, 486, 1910.**

The type species of *Aëdeomyia* Theobald is *Aëdes squamipennis* Lynch Arribálzaga.

GENERIC DIAGNOSIS OF ADULT:

Head short, closely applied to the thorax. Proboscis rather short and stout. Palpi short in both sexes. Antennæ in the female with the joints although subcylindrical, short and stout, with basal whorls of few rather coarse hairs, the ciliation coarse and abundant; in the male plumose, the joints short and stout towards the base, progressively more elongate and slender towards the apex, the last two joints much thickened and not markedly longer than the preceding ones, all but the last two somewhat thickened at insertions of hair-whorls, the hairs long and abundant. Prothoracic lobes remote dorsally. Mesothorax rather short. Scutellum not trilobate. Postnotum nude. Abdomen subcylindrical, truncate at the tip in the female, slightly expanded at the apex in the male. Wings broad, the veins on anterior half of wing well separated; second marginal cell very long, about one third the length of wing; base of second posterior cell nearer base of wing than second marginal cell; cross-veins well separated. Legs moderate, the femora and tibiæ rather short, the claws simple in the female.

GENERIC DIAGNOSIS OF LARVA:

Head large, transverse, bulging at the eyes; antennæ large, curved, greatly dilated, with ample tuft near middle and long terminal setæ; mouth-brushes ample, normal. Air-tube rather small, without pecten, with a single pair of hair-tufts near middle; a pair of stout spines and small tufts apically. Anal segment elongate, ringed by the plate. Ventral brush a series of long, unbranched feathered hairs, confined to barred area.

Tropical regions of both hemispheres.

Three species besides the present one have been referred to this genus, but of one, *Aëdeomyia americana* Neveu-Lemaire, we are sure that it does not belong here, being probably a *Culex*, while the other, *Aëdes venustipes* Skuse, was referred here by Theobald doubtfully, without having seen a specimen. The third species, *A. catasticta* Knab, is correctly referred to the genus.

Larval history and habits. The larvæ of two species are known in this genus, those of *Aëdeomyia squamipennis* and *A. catasticta*, the former from the American tropics, the latter from the tropics of the Old World. The two larvæ

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are very similar in appearance and habits. They occur in shallow permanent water associated with the aquatic plant *Pistia,* from which they probably derive their supply of air, although their habits have not been exactly determined. They occur associated with the larvæ of *Mansonia* and in the Old World also *Mansonioides.* The imagos are attracted to artificial light in the vicinity of their breeding-places and they sometimes occur in houses.

Only one species of this genus occurs in our fauna.

AËDEOMYIA SQUAMIPENNIS (Lynch Arribálzaga) Theobald.

Aëdes squamipennis Lynch Arribálzaga, El Nat. Argent., i, 151, 1878.
Aëdes squamipennis Lynch Arribálzaga, Rev. del Mus. de La Plata, ii, 162, 1891.
Ædes squamipennis Giles, Handb. Gnats or Mosq., 347, 1900.
Aëdeomyia squammipenna Theobald (in part), Mon. Culic., ii, 219, 1901.
Ædomyia squamepennis Giles (in part), Handb. Gnats or Mosq., 2 ed., 478, 1902.
Aëdeomyia squammipenna Theobald (in part), Mon. Culic., iii, 307, 1903.
Aëdeomyia squamipennis Blanchard (in part), Les Moustiques, 404, 1905.
Aëdeomyia squamipennis Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 25, 1906.
Aëdeomyia squamipennis Autran, Anal. Dep. Nac. Hig., xiv, 28, 1907.
Aëdeomyia squamipennis Peryassú, Os Culicid. do Brazil, 50, 249, 1908.
Aëdeomyia squamipennis Pazos, San. y Ben., ii, 48, 425, 1909.
Aëdeomyia squammipenna Theobald (in part), Mon. Culic., v, 487, 1910.
Aëdeomyia squamipennis Brèthes, Bol. Inst. Ent. y de Patol. Veget., i, 37, 1912.
Aëdeomyia squamipennis Knab, Proc. Ent. Soc. Wash., xv, 41, 1913.

ORIGINAL DESCRIPTION OF AËDES SQUAMIPENNIS:

Nigricans; thorace cinereo-fusco squamato; pedibus palpisque albo annulatis; alis obscure-alboque variegatis. Long. 4 l [2–5 mm.]. (Mas et fem.)

Hembra—Cabeza con la frente y vertex cubiertos de escamillas pardo-agrisadas; ojos pardo-rojos bordeados en su parte posterior por un filete plateado poco notable; la parte posterior de la cabeza gris sedosa con dos ó tres puntitos negros detrás de cada ojo.—Antenas negruzcas con el extremo de cada articulo de color gris ceniciento claro.—Palpos negros con vello gris; el extremo del último articulo de este último color.—Trompa negra con un anillo blanco puro en su medio y otro un poco antes de la punta, la cual es cenicienta clara.

Torax con el dorso cubierto de escamillas pardo-grises.—Escudete ceniciento.—Los costados del coselete son pardos de pes con escamitas grises.—Muslos anteriores blanquecinos, pero muy cubiertos de escamas negras y anillados á trechos por escamas blancas; tibias del primer par negruzcas y anilladas de blanco en su arista externa, pálidas y sin anillos en la interna.—El extremo y la base de las tibias negros, con la rodilla blanca.—Tarsos negros anillados de blanco.

Las patas del segundo par, como las del primero, aunque mas largas, mas oscuras y con dibujos mas pronunciados.—Muslos posteriores con su parte anterior oscura, con fajitas blancas, la posterior pálida desde la base hasta antes del extremo, el cual es pardo-negro.—Base y extremo de las tibias negros; la cara interna de las tibias blanquecina en el medio; la cara externa oscura, anillada de blanco.—Tarsos negros anillados de blanco, con el ultimo articulo de este color.—La base de las tibias y el extremo de los muslos parecen muy engrosados, sobre todo en los muslos posteriores é intermediarios, á causa de un copete de pelillos escamosos que lo reviste por debajo y en los lados. Alas sumamento cubiertas de escamas negruzcas de cuyo color parecen aquellas.—Una pequeña parte de la base de cada ala es blanquecina.—Tres fajitas blanco agrisadas, compuestas de manchitas pequeñas se dirijen del borde anterior al posterior del ala; la primera se halla hácia el primer tercio y es la más cercana á la base, la 2a como á los dos tercios y la última corta el ángulo anterior del ala: sus manchas son más separadas que en las otras; las franjas son negruzcas, pero una pequeña parte del borde posterior correspondiente á la tercera banda de manchitas tiene franja blanca.—Abdómen negro opaco en el dorso; el primer arco dorsal pardo con pelillos del mismo color; los tres siguientes con una manchita cenicienta en los costados; el 5° y 6° con una mancha cenicienta de forma angular, cuyo vértice se halla en medio del dorso de cada uno de ellos y se dirije hácia adelante, mientras que el extremo de sus lados vá á los costados; los siguientes vestidos de escamillas del color de los demás dibujos; vientre gris claro, sedoso.

Los machos son en casi todo iguales á las hembras, pero el color del dorso del torax tira más al gris-amarillento ó gris-rojizo de zorro.—Todo lo demás es mas oscuro en las partes negruzcas y mas puro el blanco en las otras.—Las plumas de las antenas son negruzcas.—El dorso del abdomen no presenta dibujos; los costados de

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él llevan pelillos parduzcos y escamitas cenicientas-claras que se agrupan formando manchitas de espórulas de moho. Vientre negruzco con vello ceniciento y parduzco.

Esta bella especie, cuyo dibujo es bastante difícil de expresar, no es escasa aquí. Los ejemplares que poseo los he cazado en Abril de 1878.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF AËDEOMYIA SQUAMIPENNIS:

Female.—Proboscis rather short, uniform, upcurved; vestiture of blackish scales, a broad white ring before middle and another one at apex involving labellæ, at the base a dorsal patch of yellow scales. Palpi short, about one-fourth the length of proboscis, rather stout; vestiture of coarse roughened scales, mostly black, the apical ones white, at the middle a band of yellow scales and a sprinkling of yellow scales on the basal portion. Antennæ short and rather stout; segments short and thick, narrowed basally, deep brown, with a white basal ring; pubescence abundant, silky white; second segment apically enlarged, densely clothed with broad, coarse, suberect, yellow scales; hairs of whorls short and rather sparse, black; tori rather small, globose, yellow-brown, clothed with broad yellowish-white scales. Clypeus large and prominent, conical, light brown, clothed with broad suberect yellow-white scales. Eyes separated by a crest of yellowish-white scales. Occiput covered with a dense mass of yellowish-white and black semi-erect broadly ovate scales and on the nape with a dense mass of partly black and partly dull whitish, broadly triangular, erect scales, their broad apical margins finely serrate; the black erect scales massed at back of head and large sublateral patches of ovate black scales close to ocular margins; a quadrate white patch at vertex; sides of head behind eyes spotted black and white; bristles along margins of eyes fine, moderately long.

Prothoracic lobes lateral, luteous brown, clothed with dull white scales and with many coarse black bristles. Mesonotum dark brown, densely clothed with small broadly ovate scales, on disk with ocher-yellow scales, becoming whitish on anterior edge; lateral margins blackish-brown scaled, narrowly in front, broadly along posterior two-thirds; on basal third two broad ill-defined submedian black stripes which become confluent with the lateral margins over roots of wings; basally there are also indications of a short submarginal white stripe; setæ of mesonotum rather abundant, moderately coarse and not long. Scutellum clothed with broad yellowish-white scales, a narrow line of black scales on median lobe, the lateral lobes with apical patches of raised black scales; setæ in three groups, rather coarse and moderately long. Postnotum prominent, the median ridge faintly indicated, luteous, dark at sides, nude. Pleuræ and coxæ luteous-brown with blackish spots, clothed with ovate white scales.

Abdomen subcylindrical, somewhat depressed, compressed towards apex, eighth segment subtruncate; cerci slender; dorsal vestiture of broadly ovate dull brown scales, with oblique, lateral, segmental, ill-defined dirty-white stripes which reach margins at hind angles; the whitish scales predominate on seventh and eighth segments and these bear a median patch of brilliant white scales at hind margins; first segment dark scaled and with many fine pale hairs; ventral vestiture a mixture of white and black scales, the white scales predominating at bases and apices of segments.

Wings short and broad, hyaline; vestiture along the veins so dense that very little of the wing-surface remains exposed, the fringe very long; veins on anterior part of wing well separated, so that the fourth vein crosses the wing slightly behind the middle; second marginal cell very long, about one-third the entire length of wing; base of second posterior cell nearer base of wing than base of second marginal cell; basal cross-vein slightly more than its own length from anterior cross-vein; vestiture predominatingly of dusky-brown scales with a mixture of white and ocher-yellow ones, the yellow scales showing a tendency to group in patches and densest on apical portion, basal third, and along the margins; the white scales form two slender irregular and wavy trans-

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verse bands and several patches on and near apex, one of the bands crosses the wing obliquely from the costa to the fifth vein at the basal third, the second band about two-thirds from the base extends from the costa to upper branch of fifth vein; a large yellow costal patch just in front of outer white band; scales large, very broad, and obliquely subtruncate. Halteres pale, the knobs abundantly clothed with black scales.

Legs comparatively short, femora rather stout; vestiture of dusky scales with yellow ones intermixed and with numbers of illy defined, more or less broken, white transverse bands on femora and tibiæ; mid and hind legs with tufts of long black outstanding scales involving apical portion of femora and basal portion of tibiæ; anterior tarsi with basal and median white dorsal spots on first joint, second and third joints with white dorsal spot on basal two-thirds, a minute white spot at base of fourth and apex of fifth joints; middle tarsi with bases and apices of first and second joints narrowly white marked and two white spots mesially on first joint, third and fourth joints basally broadly white marked, a small white spot at apex of fifth joint; hind tarsi with the first joint showing two white spots on median portion and another one at apex, second joint narrowly white marked at base and apex, third joint basally white nearly to middle, fourth joint white, the apical third black, fifth joint white and with an apical black spot beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 2.6 to 2.8 mm.

Male.—Proboscis straight, somewhat longer and more slender than in the female; the spot at the base white instead of yellow. Palpi short and stout, about one-fifth as long as the proboscis; vestiture of broad roughened scales, black, the apices white, an ocher-yellow ring at middle and with scattered ochreous scales on basal half. Antennæ plumose, last two joints rather long, thicker than the preceding ones, rugose, their ciliation long, the other joints shorter, pale, black at insertions of hair-whorls; hairs very long, dense, brown. Abdomen long, subcylindrical, somewhat depressed, sixth and seventh segments expanded posteriorly; claspers not exposed; dorsum mottled with ochreous scales, each segment with a pair of large sublateral apical spots of white scales; first abdominal segment with dark scales on disk, broadly margined behind with whitish scales and with similar scales on front margin; eighth segment apically with white scales; lateral ciliation long, abundant, coarse and irregular, yellowish. Coloration otherwise as in the female. Wings hardly narrower than in the female, vestiture nearly as dense. Claws long and slender; formula, 0.0–1.0–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Genitalia (plate 38, fig. 255): Side-pieces about twice as long as wide, tips rounded, a small subbasal lobe more densely setose than the rest of side-piece; clasp-filament rather short, stout, uniform, a stout claw at tip with many fine supplementary claws. Harpes and harpagones absent; unci forming a large basal prominence with double rod-like base and broad rounded tip.

Larva, Stage IV (plate 129, fig. 450).—Head flattened, broad and transverse, subquadrate, posterior angles rounded, sides bulging at the eyes, anterior margin flatly arcuate. Antennæ inserted in a notch, large and very stout, strongly curved, with a large hair-tuft at the middle; tip squarely truncate, with a stout spinose digit nearly as long as half of shaft, and three very long stout setæ; the digit has an articulated appendage at the tip; shaft minutely spinulose, colorless, hollow, except for basal muscle, tendons attached to the terminal digit and to central hair-tuft, and nerve fibers. Eyes narrow, strongly transverse, with a small patch of pigment behind. Upper pair of dorsal head-tufts in fours, lower pair small, multiple, a still smaller pair of tufts below; ante-antennal tufts large, multiple. Oral aperture wide, all the parts exposed. Mouth-brushes well developed, bent down over the mouth-parts. Mandible

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rounded quadrate, somewhat protuberant without; a group of filaments at outer angle; a long curved row of filaments at outer third; inner portion tapering slightly, bare without, dental area much reduced, represented by four weak slender teeth, a short trifid tooth within; a small chitinized angular process; a row of short filaments on the side near base. Maxillæ projecting from the lower side of mouth, long, slender, conical, with median chitinized suture; an apical row of long hairs curved over toward base; basal half of inner side with rows of fine hairs; a stout terminal seta; palpus small, but distinct from maxilla, with basal chitinous ring and rudimentary terminal digits; a membranous finger-shaped process arising between maxilla and palpus, slightly swollen outwardly, with a black line along one side. Mental plate very small, with five teeth, the middle one the largest. Thorax flattened, rounded-quadrate, with chitinous lines ventrally on the segments and posterior edge; a pair of chitinous plates in front bearing small hair-tufts; bases of lateral hair-tufts strongly chitinized and projecting, the subventral metathoracic tubercle especially conically projecting and chitinized behind; hairs long. Abdomen with the segments slightly widened centrally, uniform; lateral tubercles large, with single hairs; venter obscurely brown-banded in the centers of the segments. Lateral comb of eighth segment a large plate with row of long spines on its posterior border. Air-tube small, slender, slightly tapering, about four times as long as wide, its surface finely setose, with long, stout terminal spines and rudimentary tracheæ; a single pair of long hair-tufts near the middle and a smaller pair nearly opposite towards the dorsal aspect, a third pair at extreme apex; pecten absent. Anal segment ringed by a chitinous band, with subdorsal series of coarse irregular spines; distal end below obliquely excavated, for insertion of ventral brush, which is of sparse hairs, ciliate on their posterior sides; apex dorsally with terminal hairs; lateral hair long and double, situated subventrally close to ventral brush. (Anal gills probably small, absent in our specimen.)

The larvæ of this species have been observed only by Mr. H. W. B. Moore of the British Guiana Museum. He writes us as follows: "The larvæ of *Aëdeomyia squamipennis* live among roots of water plants, chiefly *Pistia* and *Salvinia*, resembling those of *Mansonia titillans* in this respect, though they are far from being so retiring as the latter. In a breeding-jar, for instance, those of *M. titillans* will hide themselves altogether among the roots, whereas with *Ae. squamipennis* a number of larvæ may be seen among the roots at various points. Their siphons and long body-hairs seem to keep them in position. They are fond also of lying on their backs on the muck at the bottom of the breeding-jar. Last week I timed three in this position for over two hours, and I do not know how long previously they had been lying so. Even when they shift their places it is seldom that they go to the surface. They generally go to another plant or to a new place at the bottom of the jar. They can be taken throughout the year, their breeding-places being our sweet-water canals, which have to be kept permanent, as the water is used by the common people for drinking and for domestic purposes generally. They are found only where there is a good growth of aquatic vegetation, chiefly on the plants already mentioned. Is the adult a blood-sucker? Both male and female frequently come into houses in Georgetown, our capital city. In fact, my notes show, as far at least as my house is concerned, that they visit more frequently than any other out-door or non-domestic mosquito. As regards numbers, I take as many or more on the window-panes as of those of *M. titillans*, another frequent house visitor. I have never, consciously, been bitten by *Aë. squamipennis*, either indoors or out of doors, and I have always failed to get them to bite when I have tried. Only twice have I taken a gorged female, but in each case, as far as outward appearance went, she seemed filled with something else than blood."

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The female probably does not take blood. The larvæ are obviously vegetable feeders. Their method of respiration has not been demonstrated, but as the tracheæ of the air-tube are rudimentary and the anal gills small,* it seems that the larvæ must get most of their air supply by osmosis through the body wall. They have no means of obtaining air from the roots of the aquatic plants, such as *Mansonia* larvæ have. It is possible that the inflated antennæ play some part in the respiratory process.

Tropical America, from Cuba to the Argentine.

San Antonio de los Baños, Cuba (J. H. Pazos); Puerto Barrios, Guatemala (———); Trinidad, British West Indies, June, 1905 (A. Busck); New Amsterdam, British Guiana, May 9, 1907 (J. Aiken); Georgetown, British Guiana (H. W. B. Moore); Trinidad River, Panama, March, 1912 (A. Busck); Gatun, Canal Zone, Panama, December, 1912 (J. Zetek). Reported also from Brazil (Theobald) and Argentina (Arribálzaga).

Aëdeomyia squamipennis has been reported from the tropics of the Old World, but it has been found that a different species occurs there. This form has been described from the Philippines under the name *A. catasticta*, and has been since reported from various localities in the East Indies and Africa.

Genus URANOTÆNIA Lynch Arribálzaga.

Aëdes Osten Sacken (in part), Trans. Am. Ent. Soc., ii, 47, 1868.
Uranotænia Lynch Arribálzaga, Rev. Mus. de La Plata, i, 375, ii, 163, 1891.
Ædes Giles (in part), Handb. Gnats or Mosq., 345, 1900.
Uranotænia Theobald, Journ. Trop. Med., iv, 235, 1901.
Uranotænia Theobald, Liverpool School of Trop. Med., Memoir iv, app. p. xiv, 1901.
Uranotænia Howard, Mosquitoes, 235, 1901.
Uranotænia Theobald, Mon. Culicid., ii, 241, 1901.
Uranotænia Neveu-Lemaire, Mém. Soc. Zool. France, xv, 226, 1902.
Uranotænia Neveu-Lemaire, C. R. Soc. Biol. Paris, liv, 1331, 1902.
Uranotænia Giles, Handb. Gnats or Mosq., 2 ed., 485, 1902.
Uranotænia Johannsen, Bull. 68, N. Y. State Mus., 391, 392, 427, 1903.
Uranotænia Theobald, Mon. Culicid., iii, 293, 1903.
Uranotænia Coquillett, Rev. de Med. Tropical, iv, 102, 113, 1903.
Uranotænia Felt, Bull. 79, N. Y. State Mus., 265, 341, 391*d*, 1904.
Uranotænia Lutz in Bourroul, Mosq. do Brasil, 53, 1904.
Uranotænia Lahille, Actas y Trab. 2 Congr. Med. Latino-Amer., ii, 11, 20, 1904.
Anisocheleomyia Theobald, The Entom., xxxviii, 52, 1905.
Uranotænia Blanchard, Les Moust., 406, 1905.
Pseudouranotænia Theobald, Journ. Economn. Biol., i, 33, 1905.
Uranotænia Theobald, Gen. Ins., Dipt., 26 fasc., 36, 1905.
Uranotænia Dyar, Proc. Ent. Soc. Wash., vii, 45, 49, 1905.
Uranotænia Theobald, Mosq. or Culic. of Jamaica, 8, 1905.
Uranotænia Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 186, 1906.
Uranotænia Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 11, 26, 1906.
Uranotænia Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 3, 1906.
Uranotænia Theobald, Mon. Culic., iv, 556, 1907.
Anisocheleomyia Theobald, Mon. Culic., iv, 556, 570, 1907.
Pseudouranotænia Theobald, Mon. Culicid., iv, 566, 1907.
Uranotænia Howard, Osler's Modern Medicine, i, 372, 1907.
Uranotænia Dyar & Knab, Can. Ent., xxxix, 48, 1907.
Uranotænia Autran, Anal. Dep. Nac. Hig., xiv, 29, 1907.
Uranotænia Williston, Man. No. Am. Dipt., 3 ed., 107, 1908.
Uranotænia Peryassú, Os Culicid. do Brazil, 37, 1908.
Uranotænia Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 180, 203, 1908.
Uranotænia Theobald, Mon. Culic., v, 497, 498, 1910.
Pseudouranotænia Theobald, Mon. Culic., v, 497, 524, 1910.
Anisocheleomyia Theobald, Mon. Culic., v, 497, 527, 1910.
Pseudoficalbia Theobald, Union South Afr. Dept. Agr., First Rept. Vet. Res., 272, 1911 (*nomen nudum*).
Pseudoficalbia Theobald, Trans. Linn. Soc. Lond., Zool., xv, 89, 1912.
Uranotænia Edwards, Bull. Ent. Res., iii, 37, 1912.

* See description and figures of the larva of *Aëdeomyia catasticta* by F. W. Edwards in Bull. Ent. Research, vol. 3, p. 379 (1912).

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The type species are: Of *Uranotænia* Arribálzaga, *Uranotænia pulcherrima* Arribálzaga; of *Pseudouranotænia* Theobald, *Pseudouranotænia rowlandii* Theobald; of *Anisocheleomyia* Theobald, *Anisocheleomyia nivipes* Theobald (by present designation), and of *Pseudoficalbia* Theobald, *Pseudoficalbia pandani* Theobald.

GENERIC DIAGNOSIS OF ADULT:

Palpi short in both sexes. Antennæ slender in the female, the joints suboqual, the hairs of the whorls moderate and sparse; usually plumose in the male, the last two joints long, the others shorter, somewhat thickened at the insertions of the hair whorls, each with a smaller secondary subapical whorl. Clypeus nude. Prothoracic lobes remote dorsally, prominent. Bristles of mesonotum well developed. Scutellum weakly trilobate, the middle lobe large. Postnotum nude. Abdomen subcylindrical, broadly truncate at the tip in the female. Wings with the second marginal cell usually short; second posterior cell also short; anterior and basal cross-veins well separated. Claws simple in both sexes; the claws of the mid-legs modified in the male, one of them very large, the other minute or absent.

GENERIC DIAGNOSIS OF LARVA:

Head elongate, usually with the two pairs of dorsal hairs single, strongly thickened and spine-like; antennæ small and stout; clypeus prominent; mouth-brushes rather small. Air-tube rather long with basal pecten and single pair of hair-tufts. Lateral comb of the eighth segment attached to margin of a chitinous plate. Anal segment ringed by a chitinous plate, with ventral brush of few but long hairs inserted on a small barred area.

America, exclusive of the boreal regions; also widely distributed in the warmer parts of the old world.

Uranotænia is a somewhat generalized group, although showing specialization in a number of details, such as the wing venation with its small forks of the second and fourth veins, the short palpi of both sexes and the ornamentation of brilliant scales. The reduced forks of the second and fourth veins suggest relationship with *Megarhinus* and this finds further support in the presence, in the wings of both genera, of a characteristic heavily chitinized strip behind the fifth vein; furthermore, there is in *Uranotænia* a distinct thickening in the axillary cell representing the more strongly differentiated rudimentary seventh vein of *Megarhinus*. The larva in its general appearance during life suggests *Anopheles*, and this is enhanced by the correspondence in the elongate head, prominent clypeus, similarity of mouth parts and other details. We are disposed to consider these larval resemblances as indicative of relationship, rather than as separately evolved. The closing mechanism in the breathing tube of the larva is of a distinctly primitive type, when compared with such forms as *Culex* and *Aëdes*, and this again suggests the relationships just indicated. Further indication of relationship between *Anopheles* and *Uranotænia* is found in the structure of the male genitalia, the harpes being absent in both groups. It is therefore clear that the reduction of the palpi of the imago, as elsewhere in the Culicidæ, has no deep significance and is not indicative of relationship. In fact, we believe that in the genus *Bironella*, founded on a single male from New Guinea (Theobald, Ann. Mus. Nat. Hungar., iii, 69, 1905) and generally referred to the "Anophelina" but agreeing with *Uranotænia* and *Megarhinus* in the reduced forks of the second and fourth veins, we have a transition form between *Uranotænia*, *Megarhinus* and *Anopheles*. In this form the male palpi are rather long and clavate. The female is unknown, but will probably prove to have short palpi and thus be intermediate in this respect also. Finally it may be noted that the reduction of the forks of veins 2 and 4, on which the genus *Uranotænia* largely rests, is not equally pronounced in all species, in fact weakly expressed in some; it is well marked in all the forms examined by us except in *U. anhydor*.

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Lahille, in 1904, established a subfamily, Uranotænina, for *Uranotænia* (Actas y Trabajos 2 Congr. Med. Latino-Amer., ii, 11, 20) and this has been adopted by Coquillett (1906), Peryassú (1908) and Theobald (1910).

The species being of no economic interest and of small size, comparatively little general attention and valuation have been given to what may be called a rather well-marked group.

The eggs are subcylindrical and laid in boat-shaped masses which float on the surface of the water; the single eggs are placed upright, as in *Culex*. The larvæ live generally in ground-pools of a more or less permanent character, in swamps or in the grassy edges of lakes. In Java and the Seychelle Islands the larvæ of certain species inhabit the liquid in the leaf-cups of *Nepenthes*. The larvæ, owing to the shape and coloration of the head and to their position in the water, show a resemblance to those of *Anopheles*, and are occasionally mistaken for such by inexperienced observers. There is no close resemblance, for the larvæ are not surface feeders, but lie horizontally in the water below the surface. We have no information about the habits of the adults.

Tables of the Species.

Adults, structure, and coloration.

1. Legs with the tarsi all black 2
   Legs marked with white, the last joint of hind tarsi white 4
2. Mesonotum without median blue line ..... *anhydor* Dyar (pp. 926, 1041)
   Mesonotum with median blue line 3
3. Blue line extending the whole length of mesonotum
   sapphirinus Osten Sacken (p. 901)
   Blue line ending at antescutellar area ..... *socialis* Theobald (p. 905)
4. Mesonotum with a median blue stripe ending at antescutellar area
   pulcherrima Lynch Arribálzaga (p. 908)
   Mesonotum not so marked 5
5. Mesonotum with a blue spot before antescutellar area 6
   Mesonotum without blue ornamentation on median line 7
6. Hind legs with last two joints and tip of third white
   geometrica Theobald (p. 918)
   Hind tarsi with last joint white, the fourth black in the middle
   pulcherrima, variety *apicalis* Theobald (p. 908)
7. Thorax with a white lateral line 8
   Thorax without such marking 9
8. Abdomen with apical segmental white patches; thorax white-marked before
   calosomata Dyar & Knab (p. 922)
   Abdomen with basal segmental bands; thorax without white anterior marks
   basalis Howard, Dyar & Knab (p. 917)
9. Abdomen without white lateral spots ..... *typhlosomata* Dyar & Knab (p. 924)
   Abdomen with lateral spots 10
10. Knees white-marked ..... *lowii* Theobald (p. 911)
    Knees not white-marked ..... *continentalis* Dyar & Knab (p. 914)

The following species is not included as the adult is unknown: *coatzacoalcos* Dyar & Knab.

Adults, male genitalia.

1. Clasp-filament with many terminal claws ..... *lowii* Theobald (p. 913)
   Clasp-filament with a single terminal claw 2
2. False harpagones forming a group of closely placed subequal teeth 3
   False harpagones with separated plates or rods 5
3. False harpagones with fine teeth ..... *typhlosomata* Dyar & Knab (p. 926)
   False harpagones with large, coarse teeth 4
4. Clasp-filament nearly as long as the side piece .... *geometrica* Theobald (p. 921)
   Clasp-filament shorter than the side piece .... *sapphirinus* Osten Sacken (p. 903)
5. Erect plate of false harpagones broad, furcate at tip .. *socialis* Theobald (p. 907)
   Erect plate of false harpagones slender, rod-like, widely branched 6
6. Outer plate of false harpagones small, basal
   basalis Howard, Dyar & Knab (p. 918)
   Outer plate of false harpagones recurved, forming a large loop
   calosomata Dyar & Knab (p. 924)
   Outer plate of false harpagones a stout recurved loop
   pulcherrima Lynch Arribálzaga (p. 910)

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The following are not included in the table, as we possess no male specimens: *continentalis* Dyar & Knab, and *coatzacoalcos* Dyar & Knab, while of *anhydor* Dyar the genitalia have not been microscopically prepared.

LARVÆ.

1. Dorsal head-hairs not developed into spines, the upper pair multiple *anhydor* Dyar (p. 927)
   Both pairs of dorsal head-hairs developed into thick spines..... 2
2. Antennæ glabrous ..... *geometrica* Theobald (p. 921)
   Antennæ more or less strongly spiculate..... 3
   Lateral plate of the eighth segment with five large teeth *pulcherrima* Lynch Arribálzaga (p. 910)
3. Lateral plate of the eighth segment with six to nine teeth..... 4
   Lateral plate with about twelve teeth..... 7
4. Antennæ with many coarse spines..... *sapphirinus* Osten Sacken (p. 903)
   Antennæ with few coarse spines..... 5
5. Pecten teeth of the tube with a wide transparent fringe on one side *lowii* Theobald (p. 913)
   Pecten teeth of the tube narrowly fringed on both sides..... 6
6. Upper lateral head-hair long, single ..... *coatzacoalcos* Dyar & Knab (p. 916)
   Upper lateral head-hair short, double.... *basalis* Howard, Dyar & Knab (p. 918)
7. Antennæ with few coarse spicules..... *typhlosomata* Dyar & Knab (p. 926)
   Antennæ with many minute spicules..... *calosomata* Dyar & Knab (p. 924)

The following species is not included in the table, as our specimen is imperfect: *continentalis* Dyar & Knab. We have also omitted *socialis* Theobald, as our single larva is imperfect.

URANOTÆNIA SAPPHIRINUS (Osten Sacken) Lynch Arribálzaga.

Aëdes sapphirinus Osten Sacken, Trans. Am. Ent. Soc., ii, 47, 1868.
Uranotænia saphirinus Lynch Arribálzaga, Rev. Mus. de La Plata, ii, 164, 1891.
Aëdes sapphirinus Howard, U. S. Dept. Agr., Div. Ent., Bull. 4, n. s., 24, 1896.
Aëdes sapphirinus Coquillett, U. S. Dept. Agr., Div. Ent., Circular 40, 8, 1900.
Aëdes sapphirinus Howard, U. S. Dept. Agr., Div. Ent., Bull. 25, n. s., 22, 47, 1900.
Ædes saphirinus Giles, Handb. Gnats or Mosq., 354, 1900.
Uranotænia saphirina Theobald, Mon. Culic., ii, 249, 1901.
Uranotænia sapphirina Howard, Mosquitoes, 236, 1901.
Uranotænia sapphirinia Dyar, Journ. N. Y. Ent. Soc., ix, 179, 1901.
Uranotænia sapphirinia Dyar, Proc. Ent. Soc. Wash., v, 49, 1902.
Uranotænia saphirina Giles, Handb. Gnats or Mosq., 2 ed., 492, 1902.
Uranotænia sapphirinia Dyar, Proc. Ent. Soc. Wash., v, 145, 1903.
Uranotænia sapphirina Johannsen, Bull. 68, N. Y. State Mus., 427, 1903.
Uranotænia sapphirinia, Felt, Bull. 79, N. Y. State Mus., 342, 391e, 1904.
Uranotænia sapphirinia Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 337, 1905.
Uranotænia sapphirinia Blanchard, Les Moustiques, 407, 1905.
Uranotænia sapphirinia Felt, Bull. 97, N. Y. State Mus., 447, 493, 1905.
Uranotænia sapphirina Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 187, 1906.
Uranotænia sapphirina Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 26, 1906.
Uranotænia saphirina Theobald, Mon. Culic., iv, 557, 1907.
Euratoneus sapphyrrina Viereck, 1st Ann. Rept. Comm. Health Pa., 471, 1908.
Uranotænia sapphirina Pazos, Anal. Acad. Cien. méd., fisc. y nat. Habana, xlv, 427, 1908.
Uranotænia saphirinus Pazos, San. y Benef., ii, 49, 551, 1909.
Uranotænia sapphirina Theobald, Mon. Culic., v, 502, 1910.
Uranotænia sapphirina Morse, Ann. Rept. N. J. State Mus., 1909, 721, 1910.
Uranotænia sapphirina Thibault, Proc. Ent. Soc. Wash., xii, 16, 1910.

ORIGINAL DESCRIPTION OF AËDES SAPPHIRINUS:

♂♀.—Fuscus; fronte, thoracis lineâ mediâ et pleurarum strigis cyaneo-micantibus; pedibus nigris; coxis, femorumque basi pallidâ; femorum tibiarumque extremo apice superne niveis. Long. corp. 0.13. Long. al. 0.12 of an inch.

Front blackish, with a metallic-blue reflection along the eyes, especially in the middle; antennæ blackish, scapus tawny; those of the male apparently 15-jointed (13 + 2); flagellum with 12 beautifully bearded joints; a thirteenth, elongated, linear joint has some scattered hairs, but no beard like the preceding ones. Proboscis long, reaching in the male, if bent backwards, to about the middle of the abdomen; rather conspicuously incrassated at the tip; perhaps still longer in the

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female (the abdomen of my female specimen is somewhat injured). Thorax brownish-tawny, darker above, paler on the pleurae; a metallic blue longitudinal line along the middle of the thorax reaches the scutellum; three similar marks on the pleurae, the upper of which is in the shape of a short line running from the base of the wing towards the head. Abdomen brownish above, paler below; knob of the halteres brown, stem pale. Feet brownish, paler at the base; a snow-white dot on the upper side of the tip of the femora and of the tibiae; when looked at very obliquely these white dots appear slightly pale bluish, and the tibiae and tarsi likewise show a faint bluish reflection. Wings clothed with brown scales, but showing, in an oblique light, numerous blue reflections especially a stripe near the basis, between the third and fourth longitudinal veins. (Washington, D. C.; Brooklyn, N. Y., by Mr. Brevoort.)

***Observation.*—In my female specimen the scales are somewhat rubbed off on the feet, which for this reason appear pale-tawny; still the white dots are distinctly visible.**

DESCRIPTION OF FEMALE, MALE, LARVA, AND PUPA OF URANOTÆNIA SAPPHIRINUS:

Female.—Proboscis rather long and slender, much dilated at apex, with numerous fine cilia; vestiture of black scales. Palpi very short and stout, clavate, clothed with black scales and with scattered long black bristles. Antennæ long and slender, the joints subequal, rugose, brown, with long and coarse ciliation; second joint slightly thickened; hairs of whorls rather long, sparse; tori globose, with an apical excavation, ocherous with a dark-brown spot on inner side. Clypeus large, convex, broadly conical, constricted at base, brown. Eyes narrowed above, not contiguous. Occiput covered with broad flat recumbent scales, broadly metallic violet-blue in front and at the sides, posteriorly black and brown; bristles along margins of eyes coarse, long, black, directed forward.

Prothoracic lobes well separated, large and prominent, contiguous with the head, covered with broad, flat, metallic violet-blue scales, and with a few coarse black bristles. Mesonotum rich yellow-brown with a dark median longitudinal stripe; clothed rather sparsely with minute hair-like bronzy brown scales, a median line of broad, flat, brilliant metallic blue scales extends the entire length of the mesonotum and is continued by a broader patch on the scutellum; there are marginal stripes of brilliant blue scales beginning about one-third from the anterior angles and terminating at roots of wings; bristles coarse and long, black, in subdorsal and lateral series. Scutellum with the median lobe very large, broadly rounded, the lateral angles prominent; lateral lobes clothed with outstanding, clavate, dark brown scales, middle lobe brilliant blue scaled; each lobe with a few coarse long setæ. Postnotum yellow-brown, large and broad, nude. Pleuræ brownish yellow with a large patch of broad, brilliant metallic blue scales at the middle, coxæ luteous; pleural bristles coarse, brown.

Abdomen subcylindrical, depressed, broad, nearly parallel sided, apex truncate; dorsal vestiture of dusky scales with greenish-blue iridescence in some lights; third, fifth, and sixth segments with a median apical patch of dirty-white scales, that on fifth very broad; fifth and sixth segments with hind angles white marked; ventral vestiture of dirty whitish scales; distal segments with scattered fine pale cilia; marginal cilia of segments sparse, coarse, long at sides, pale.

Wings rather broad, hyaline; second marginal cell small, about one-third as long as its petiole; second posterior cell longer, but shorter than its petiole; basal cross-vein more than its own length from anterior cross-vein; scales of veins small, broadly truncate, brown; fifth vein with basal half broadly clothed with broad brilliant metallic pale blue scales, much larger than the brown scales; a short patch of similar scales at root of first vein; second, third, fourth and upper branch of fifth veins with large, outstanding lanceolate scales, very pale on all but basal two-thirds of second vein; fringe broad. Halteres whitish, knobs dark and clothed with dusky scales.

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Legs slender and rather long; vestiture dusky black, bronzy brown in some lights; knees brilliant white scaled; apices of femora with a patch of white scales. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 2.8 mm.

Male.—Proboscis straight, long, and slender, apical portion greatly swollen and with many stiff setæ; vestiture of dusky brown scales. Palpi very short and stout, clavate, nearly hidden by the clypeus, clothed with dusky brown scales. Antennæ densely plumose and rather long, in consequence the whorls far apart; joints subequal, cylindrical; hairs of whorls long, halfway between the large whorls a whorl of very short hairs; tori rather large, dark brown. Coloration as in the female. Abdomen somewhat longer than in the female, subcylindrical, broadened somewhat through fifth, sixth and seventh segments; lateral ciliation moderately abundant, rather coarse, long, pale, irregular. Wings much narrower than those of the female; vestiture about the same; stems of fork-cells longer, the anterior and basal cross-veins more closely approximated. Mid tarsi with a single, very large and broad, simple claw. Claw formula, 0.0–0–0.0.

Length: Body about 2 to 2.5 mm.; wing 2.2 to 2.6 mm.

Genitalia (plate 38, fig. 252): Side-pieces very short, rounded, about twice as long as wide or less, basal lobe broad and low, clothed with many hairs; clasp-filament expanded before middle, constricted just before tip, bearing a small terminal articulated claw. False harpes lamellate, revolute, bearing a row of teeth within; false harpagones represented by a long, stout smooth process which is twice curved; unci forming a central cone with divided tip. No basal appendages.

Larva, Stage IV (see figure of entire larva, plate 83).—Head elongate, longer than wide, bulging at sides, front margin with a median emargination, limited on each side by a sharp spinose process projecting over clypeal spines, a deep notch at insertion of antennæ. Antennæ small, subcylindrical, stout, thickened at base, spined on one side, a single small hair at basal third; four unequal terminal spines, a pedicel with one large and one small digit. Eyes moderate, pointed. Both pairs of dorsal head-hairs very stout and thick, single; a pair of two-haired tufts below; ante-antennal tuft of four hairs, remote from antennæ. Mental plate rounded triangular, apical tooth round, short; six teeth on each side, the last three small, merely rounded irregularities. Mandible quadrangular, the area below dentition squarely exserted; four filaments before tip, two large, two smaller, with a dense group of hairs before collar; cilia at edges supplanted by filaments; dentition heavy, of two sets of teeth on a process, rounded, the first longest in each group; second group with two very large round teeth before and smaller ones at base, a broad serrate filament within; exsertions with hair-tufts at tip; three long serrate filaments and a row of stout hairs within. Maxilla hemispherical, divided by a suture, hairy, outer half less densely so; a group of serrate filaments at apex on suture; two jointed filaments near middle of outer half; palpus small, with six digits of different lengths. Thorax subquadrate, wider than long; hairs abundant, the subdorsal tufts of mesothorax and metathorax short and stellate; subdorsal prothoracic tufts multiple. Abdomen moderate, anterior segments shorter; lateral tufts of first two segments long, in fours, nearly obsolete on the other segments; secondary hairs with two distinct subdorsal and sublateral series of stellate tufts. Tracheal tubes narrow, flexuous. Air-tube slender, straight, about five times as long as wide, a moderate multiple tuft near middle, beyond pecten; pecten of short evenly spaced teeth, the separate teeth flat scales, deeply serrate and with base widened on one side. Lateral comb of eighth segment a row of teeth on distal edge of a large transverse chitinous plate; single teeth conical and spine-like.

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Anal segment slightly longer than wide, ringed by the plate which has a row of spines along posterior margin; dorsal tuft of three hairs on each side; a small lateral tuft; ventral brush rather small but well developed, confined to barred area; anal gills short, about as long as anal segment, tapered.

Pupa (plate 150, fig. 711).—Cephalothoracic mass subpyriform, tufts above eyes large; air-tubes very long, slender, cylindrical, not expanded. Abdomen moderate, hairs well developed, especially the subdorsal ones on posterior segments; small tufts at posterior angles of eighth segment; anal paddles elongate ovate with finely serrulate margin and minute single terminal spine.

Dr. Dyar has published the following observations on the developmental stages:

"The eggs form a boat-shaped mass floating on the surface of the water, much as in *Culex pungens*, but the mass is smaller, containing a less number of eggs and is less regularly elliptical, more angular. It floats less on the surface, the middle eggs being nearly half submerged. The sculpture and color of the individual eggs also are different. The newly hatched larva at once takes up the usual feeding position. This is essentially as in *Culex*, but the body is held more flatly, more parallel to the surface, yet below the surface film. Consequently, though feeding as *Culex*, the larvae resemble *Anopheles* at a casual glance and were several times at first mistaken for them. The larvæ are fond of resting below the leaves of the *Lemna*, where they remain with the air tube penetrating the surface film and feed, often with a rotary motion of the body on the air tube as an axis. Occasionally they bend up to feed at the surface. They are not timid and often a considerable commotion of the water is necessary to send them to the bottom. The head may be partly rotated on the neck, but the habit is not so completely developed nor so frequent as in *Anopheles*, which regularly feeds with the head inverted. It has an elongate, dark brown head with a contrasting pale body, the hairs of the anterior abdominal segments markedly longer than those of the succeeding ones. Of the local species (at Bellport), it most suggests the species of *Anopheles*, as above noted. The long anterior hairs assist in the deceptive appearance. There seem to be four larval stages, the last three being essentially alike, except for the successively larger size. This is shown best by the head, as in Lepidopterous larvæ. The head gradually becomes paler, being black in the young larva and brown in the large ones. The pupa resembles that of *Culex*, but is very small and has unusually long air tubes. The species seems to breed continuously all summer, preferring warm stagnant pools of some size, containing *Spirogyra*."

To this Professor Smith of New Jersey adds the following:

"At Lahaway I found the egg boats near the shallow edge of a large fish pond and the larvæ among the vegetation along the shallow edge of a lily pond in late June. Mr. Grossbeck found larvæ in Cadwalader Park, Trenton, August 5th; Mr. Brehme found it at Metedeconk, September 23d, and at Irvington, September 15th. Mr. Brakeley has found single specimens at different periods during the summer. It is what he calls a local breeder, being found in about the same places each year and always in permanent bodies of water."

Dr. Hiram Byrd has bred this species from larvæ found in a small stream in the city, at Jacksonville, Florida.

Eastern United States, from New Hampshire to the Gulf of Mexico, Florida and Cuba.

Center Harbor, New Hampshire, July 27, 30, 1902 (H. G. Dyar); Dublin, New Hampshire, August, 1909 (H. G. Dyar); Ithaca, New York, August 8, 19, 1901, October 2, 1902 (O. A. Johannsen); Bellport, New York, September

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2, 1901 (H. G. Dyar); Lakeland, Maryland (F. Knab); Plummer's Island, Maryland, September 16, 1906 (F. Knab); Washington, District of Columbia, September 8, 1901 (J. Kotinsky); Agricultural College, Mississippi, September 11, 1905 (W. V. Reed); Scott, Pulaski County, Arkansas, August 24, 1909 (J. K. Thibault, Jr.); Jacksonville, Florida, March 23, 1905 (Dyar & Caudell); Jacksonville, Florida, July 2, 1906 (H. Byrd); San Antonio de los Baños, Cuba (J. H. Pazos). Also reported from Brooklyn, New York (Osten Sacken), New Jersey (J. B. Smith) and Baton Rouge, Louisiana (J. W. Dupree).

URANOTÆNIA SOCIALIS Theobald.

Uranotænia socialis Theobald, Mon. Culic., ii, 340, 1901.
Uranotænia socialis Giles, Handb. Gnats or Mosq., 2 ed., 494, 1902.
Uranotænia socialis Blanchard, Les Moustiques, 411, 1905.
Uranotænia socialis Theobald, Mosq. or Culic. of Jamaica, 35, 1905.
Uranotænia socialis Felt, Bull. 97, N. Y. State Mus., 493, 1905.
Uranotænia socialis Grabham, Can. Ent., xxxvii, 403, 1905.
Uranotænia socialis Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 187, 1906.
Uranotænia coquillettii Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 186, 187, 1906.
Uranotænia socialis Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 26, 1906.
Uranotænia socialis Pazos, San. y Ben., ii, 49, 552, 1909.
Uranotænia socialis Theobald, Mon. Culic., v, 502, 1910.

ORIGINAL DESCRIPTION OF URANOTÆNIA SOCIALIS:

Thorax deep chestnut-brown, with a metallic mauve median line ending at the bare space in front of the scutellum, a similar coloured patch in front of the root of each wing and a small median one on the scutellum. Abdomen black, unbanded and unspotted, but sometimes showing a pearly apical patch on the fifth or sixth segment. Legs blackish, unbanded, but with a white knee spot and white speck at the tip of the tibiæ. Wings with a pale blue tint at the root of the fifth long vein.

♀. Head dark, covered with flat black scales and flat metallic-blue ones bordering the eyes in the middle; clypeus fawn coloured; palpi brown, very hairy; antennæ brown with grey bands, basal joint bright testaceous; proboscis black, swollen apically.

Thorax brown, with a yellowish and chestnut tinge, with very small bronzy-brown scales, a median row of small flat blue scales ending before the bare space in front of the scutellum, another long patch just in front of the roots of the wings and some just underneath, on each side of the median blue line a row of black bristles, also a lateral row and others at the sides; scutellum dark brown in the middle, ochraceous at the sides, the mid lobe covered with flat blue and brown scales, the lateral with a few black scales; metanotum bright, clear brown; pleurae pale brown, with a small patch of blue scales; the prothoracic lobes are small but covered with flat blue scales.

Abdomen steely-brown, covered with rather irregular black scales, venter greyish.

Legs dark brown, the fore and mid femora swollen, coxae and venter of femora pale, apex of femora with a snow-white spot, largest in the hind legs, apex of tibiae with a smaller snow-white spot; ungues small, equal and simple.

Wings with brown scales except at the base of the fifth long vein, where there is a long patch of clear blue scales, almost white in some lights; upper border of wing, sub-costal, and first long vein densely deep brown scaled, second long vein close to the first, its fork-cell small, its lower branch with large Taeniorhynchus-like lateral scales, its stem passing well into the basal cell and some way past the marginal transverse vein, third long vein with long Taeniorhynchus-like scales along all the upper side and partly along the lower; the branches of the second posterior cell with similar lateral scales, the second posterior cell much larger than the first sub-marginal; posterior cross-vein considerably longer than the mid cross-vein, about its own length distant from it.

Halteres with ochraceous stem and fuscous knob.

Length.—2.2 mm.

♂. Ornamented as in the ♀; antennæ deep brown, with grey bands and deep brown plume-hairs, basal joint brown; palpi deep brown; proboscis nearly black; eyes widely separate, the frons covered with flat blackish-brown scales. Abdomen black, the sixth segment with an apical pearly patch. Ungues of the fore legs very

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slightly unequal, small; mid ones unequal, the larger fully developed, sickle-shaped, simple; the hind ungues small, simple, slightly unequal.

Length.—2 mm.

Time of capture.—March (Grabham) (11).

Habitat.—Jamaica.

Observations.—Described from a series sent by Dr. Grabham. It is very close to *U. Natalia* of Arribalzaga, but differs from it in having only one pearly abdominal band.

The species can easily be told from the other *Uranotænia* of the West Indies and South America by this character and by the unbanded legs, with the white knee and tibial spots which sometimes show pale blue. Dr. Grabham writes: "Found in association with *Anopheles* larvæ in stagnant permanent pools, about the Kingston district. I have not been able to persuade this form to feed from my finger when placed in the netting of the breeding-jar."

ORIGINAL DESCRIPTION OF URANOTÆNIA COQUILLETTI:

Near *socialis* Theob., but differentiated by the characters given in the table. Dr. Dupree sent the specimens to Miss Mitchell and Mr. Coquillett named them "*Uranotænia socialis* Theob." We dedicate the species to Mr. Coquillett, who has certainly performed a vast amount of labor on a difficult subject, whatever we may think of his results.

The following is an abstract of the table:

1.	Antennæ with scattered spines; longest terminal seta shorter than antenna	2
2.	Terminal setæ four	4
4.	Antennæ with the hair at about the basal third	5
5.	Pedicellate digit double, the two forks about equal in length	6
6.	Shortest spine slender, filiform; apical tooth of labial plate triangularly pointed	*coquilletti*

DESCRIPTION OF FEMALE, MALE, AND LARVA OF URANOTÆNIA SOCIALIS:

Female.—Proboscis long, slender at base, apical fourth much enlarged; labellæ large; vestiture of black scales; cilia numerous, particularly towards apex. Palpi very short, stout, clavate; vestiture of blackish scales and with a few very long setæ at apex. Antennæ long and slender, the joints subequal, with the ciliation coarse and rather sparse, second segment longer and considerably stouter than the succeeding one; hairs of whorls long, sparse; tori large, globose, with an apical excavation, light yellow-brown. Clypeus large and prominent, broadly subtriangular, the base constricted, brown, shining, nude. Occiput covered with very broad recumbent scales, brown and black, the anterior margin broadly pale metallic-blue scaled; bristles along margins of eyes black, a pair of large pale ones projecting forward between the eyes.

Prothoracic lobes prominent, remote dorsally, covered with broad, flat, pale metallic blue scales and with a few black bristles. Mesonotum yellow-brown with a dark median longitudinal stripe; vestiture of sparse, narrow curved, dark bronzy-brown scales, a narrow median stripe of broad, pale metallic blue scales beginning near anterior margin and extending to antescutellar space; a short lateral marginal stripe of pale blue scales from near middle to root of wing; setæ rather sparse but long, in submedian and lateral series, shorter setæ at sides of median blue stripe. Scutellum with lateral angles acute, median lobe large, broadly rounded; lateral and median lobes with clavate dusky-brown outstanding scales, median lobe with a large patch of broad, flat silvery-blue scales; each lobe with a few long bristles. Postnotum large, convex, yellow-brown, nude. Pleuræ yellow-brown with a large median dark brown spot bearing an elongate patch of broad, flat silvery-blue scales; bristles coarse, black.

Abdomen subcylindrical, somewhat depressed, truncate at tip; dorsal vestiture of dusky-brown scales, in some lights black with bluish iridescence; fifth segment with a large median triangular white patch on hind margin; ventral vestiture of dirty yellowish-white scales with silvery luster; marginal cilia of

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segments coarse and pale, ventral surface with scattered coarse cilia which become abundant on distal segments.

Wings rather broad, hyaline; second vein very closely approximated to first, second marginal cell short, about one-fourth the length of its petiole; second posterior cell larger but much less than its petiole in length; basal cross-vein long, slightly less than its own length from the short anterior cross-vein; scales of veins dusky brown, small; distally large, sparse, outstanding, broadly lanceolate pale scales along forks of second and fourth veins and along entire length of third vein; on basal part of wing an interrupted broad stripe of broad light silvery-blue scales, for a short distance this extends along the fourth vein, then continues more broadly on the fifth vein, extending to about one-third its length from base; fringe very broad. Halteres pale, with large knobs bearing some minute dark scales.

Legs rather long and slender; vestiture dusky brown, in some lights black with bluish iridescence; femora pale at base beneath; knees broadly silver-white scaled; apices of tibiæ with a large brilliant patch of white scales. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.2 mm.

Male.—Proboscis long and slender, dilated at apex; labellæ large; apical portion with many rather coarse bristles; vestiture of dusky-brown scales. Palpi short, stout, clavate, almost hidden by the clypeus, with a few coarse setæ and clothed with brown scales. Antennæ plumose; last two joints long, rugose, brown, with long ciliation, the others much shorter, but still elongate and slender, brown with a narrow white ring; hairs of whorls very long, a whorl of short hairs halfway between the whorls of long hairs; tori large, yellow-brown. Abdomen subcylindrical, more elongate than in the female, blunt at apex, the claspers not prominent, without distinct lateral ciliation. Wings somewhat narrower than those of the female, hyaline; venation and vestiture similar. Claw formula, 0.0–0–0.0.

Length: Body about 2.5 mm.; wing 2.2 mm.

Genitalia (plate 37, fig. 249): Side-pieces short, about twice as long as wide, tips conically rounded; basal lobe broad, low, with fine dense setæ. Clasp-filament moderate, swollen beyond middle, with a minute terminal claw. False harpes rather broad, with revolute margins, tips rounded. False harpagones divided into several portions, an inner broad plate forked at tip and several small basal portions with recurved tips.

Larva, Stage IV.—Head rounded elliptical, widest through eyes; clypeus rounded, protruding. Antennæ small, with a single hair near the base and a few coarse spines at tip. Both pairs of dorsal head-hairs thickened, spinose; ante-antennal tufts in threes. Air-tube about four times as long as wide, scarcely tapering; pecten not reaching middle, of twelve teeth, followed by a single tuft. Lateral plate of eighth segment large, elliptical, with eight teeth on its posterior border. Anal segment ringed by the plate. Ventral brush confined by the chitinous ring. (The single specimen is in poor condition, so that the structure of the teeth of the tube and lateral plate can not be made out.)

Dr. Grabham found the larvæ in permanent pools. He says that the larva rests horizontally just under the surface-film. The habits are probably essentially like those of *Uranotænia sapphirinus*.

Antilles; possibly also the Gulf coast of United States.

Havana, Cuba, May 14, 1902, November 10, 1903 (J. R. Taylor); Rockport, Jamaica, April, 1906 (M. Grabham); St. Thomas, West Indies, August, 1905 (A. Busck).

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We have referred *Uranotænia coquilletti* as a synonym of *Uranotænia socialis* because we do not possess any specimens of the adults, and the larval characters on which it was founded are not reliable. The minute characters of the structure of the antennæ of the larvæ are not only inconspicuous, but partly imaginary, depending upon the position of the preparation. It was the intention of Dr. J. W. Dupree, who collected the material, that specimens should have reached us; but after his death the intervention of other persons prevented this. We have therefore no material to support the species *Uranotænia coquilletti*, and feel obliged to refer it to the synonymy, without, however, surrendering the probability that the mainland form is specifically distinct from the insular one. The receipt of further material may warrant the resurrection of the name.

URANOTÆNIA PULCHERRIMA Lynch Arribálzaga.

Uranotænia pulcherrima Lynch Arribálzaga, Rev. Mus. de La Plata, ii, 165, 1891.
Ædes pulcherrimus Giles, Handb. Gnats or Mosq., 352, 1900.
Uranotænia pulcherrima Theobald, Mon. Culic., ii, 244, 1901.
Uranotænia pulcherrima Giles, Handb. Gnats or Mosq., 2 ed., 487, 490, 1902.
Uranotænia apicalis Theobald, Mon. Culic., iii, 298, 1903.
Uranotænia pulcherrima Theobald, Mon. Culic., iii, 303, 1903.
Uranotænia pulcherrima Lutz in Bourroul, Mosquitos do Brasil, 65, 1904.
Uranotænia pulcherrima Blanchard, Les Moustiques, 407, 1905.
Uranotænia apicalis Blanchard, Les Moustiques, 411, 1905.
Uranotænia pulcherrima Theobald, Mon. Culic., iv, 557, 1907.
Uranotænia pulcherrima Autran, Anal. Dep. Nac. Hig., xiv, 30, 1907.
Uranotænia pulcherrima Peryassú, Os Culicideos do Brasil, 52, 260, 1908.
Uranotænia pulcherrima Newstead & Thomas, Ann. Trop. Med. & Par., iv, 147, 1910.
Uranotænia pulcherrima Theobald, Mon. Culic., v, 498, 501, 1910.
Uranotænia apicalis Theobald, Mon. Culic., v, 502, 1910.
Uranotænia pulcherrima Brèthes, Bol. Inst. Ent. y de Patol. Veget., i, 43, 1912.

ORIGINAL DESCRIPTION OF URANOTÆNIA PULCHERRIMA:

Testacea, abdomine fusco; capite antice, humeris, mesonoti linea media longitudinali postice interrupta, ante scutellum linea transversa, ante alarum insertionem linea marginali antice abbreviata metallice cyaneis. Pleuris cyaneo-maculatis. Alis hyalinis parce fusco-squamulatis. Pedibus testaceis, tibiis tarsisque fuscis vel fusco-nigris, his niveo-annulatis, geniculis niveis. Abdomine supra margaritaceo-fasciato.—Long. 2-2 3/4 millim.

Antennæ proboscide parum breviores, testaceo-piceae, feminae fusco-pilosae, maris dense longeque plumosae, torulus magnus, testaceus. *Caput* inferne testaceum, anticè metallicè cyaneum, posticè è squamulis margaritaceis tectum. *Palpi maxillares* picei. *Proboscis* capite thoraceque paulo longior, dimidio apicali breviter ciliata (♂), testacea, apice infuscata. *Thorax* testaceus, suprâ linea media longitudinali posticè abbreviata scutellum haud attingente, sutura transversa prescutellari et scutello in medio metallicè cyaneis, utrinque ante alarum insertionem prope marginem linea metallica cyanea anticè abbreviata instructus; callus humeralis metallicè cyaneus. *Pleurae* dilute coeruleo-maculatae. *Alae* hyalinae, fuscano-squamulatae. *Halteres* pallidi. *Pedes* ad partim flavicantes, *femora* inferne et summa basi dilute flavida, suprâ sat dense fusco-squamata, *geniculae* niveae, *tibiae* fuscae apice niveae, *tarsis*, articulis omnibus apice niveo. *Abdomen* angustum, fuscum, modice villosum et pilosum, superne transversim margaritaceo-fasciatum, subtus griseum.

Hab. observ.: Prov. Buenos Ayres in *Las Conchas* (E. L. Holmberg).

Es un bellisimo *Culicidae*, notable por las rayas y manchas azul-metálicas que se destacan sobre un fondo testáceo-ferruginoso y por las bandas de color perla que adornan su abdómen. Sólo tres ejemplares recojidos por el Dr. E. L. Holmberg, en las riberas del Rio Lujan, figuran en mi coleccion. Se parece mucho, segun la descripcion, al *Ædes saphirinus*, Ost.-Sacken, del que difiere por su escudete, en gran parte azul metalico, y su color mas claro en general.

ORIGINAL DESCRIPTION OF URANOTÆNIA APICALIS:

Thorax bright brown, with deep brown curved scales and a small blue spot before the scutellum and a line of blue scales at the roots of the wings; a few pale blue scales on the prothoracic lobe and on the median lobe of the scutellum, and some pale blue scales on the head and pleurae. Abdomen brown, with apical pearly-

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white bands. Wings with a long blue patch on the root of the fifth long vein. Fore and mid legs deep brown, unbanded; in the hind all the joints have apical white spots and the last joint entirely white.

♂. Head with flat black scales and a median patch of pale blue and a small patch on each side; proboscis, palpi, and antennæ deep brown, basal joint of the latter bright ferruginous.

Thorax bright brown, with narrow-curved brown scales and a patch of flat pale blue scales in front of the root of each wing, and a small spot in front of the space before the scutellum; prothoracic lobes with a few blue scales and long black bristles; scutellum with pale blue flat scales to the median lobe; metanotum brown; pleurae bright brown, with pale blue spots.

Abdomen brown, with apical pale bands, two prominent, and pearly-white.

Legs deep brown, with bronzy reflections, the hind legs with white apices to the joints, the last tarsal all white and the base also of the penultimate; ungues of the fore and mid legs unequal, much curved, simple, hind equal and simple.

Wings with brown scales, those on the first longitudinal and on the sub-costal large, the lateral ones of the third long vein few and large, lanceolate, a few black small ones at its base, those on the branches of the second fork-cell the same; costal border with long black spine-like scales; first sub-marginal cell about half the size of the second posterior, its stem about two and a half times as long as the cell; stem of the second posterior about one-fourth longer than the cell; posterior cross-vein about its own length distant from the mid cross-vein.

Length.—2.5 to 3 mm.

♀. Head with flat black scales and two lateral pale blue (almost white) patches and a blue patch between the eyes; antennae brown, basal joint bright testaceous. Legs, etc., as in the ♂; ungues equal and simple.

Wings with brown scales, the first sub-marginal cell very small, very little more than half the size of the second posterior, its stem three times as long as the cell; stem of the second posterior longer than the cell; posterior cross-vein about two-thirds of its length distant from the mid cross-vein; scales brown except at the base of the fifth long vein, where they are metallic pale blue (yellow under the microscope). The scales on the sub-costal, first and second long veins broad and short and end somewhat asymmetrically; lateral ones on the third, branches of the fourth and apex of the upper branch of the fifth long and lanceolate; at the base of the third is a dark row of short thick scales, those on the remainder of the veins short and thick; the blue basal scaled patch is composed of about a dozen large inflated scales. The hind legs are banded as in the ♂; the fore and mid unbanded.

Length.—2.8 to 3 mm.

Habitat.—Antigua (Forrest).

Time of capture.—January.

Observations.—Described from a series of ♂'s and ♀'s, but the ♂'s only are quite perfect. It comes very near *U. geometrica*, but can at once be told from it by the last hind tarsus only being white, not the last two as in *geometrica*, nor are the apical abdominal bands triangular. The thoracic scales are as in *geometrica*.

DESCRIPTION OF MALE AND LARVA OF URANOTÆNIA PULCHERRIMA:

Male.—Proboscis long, slender, much expanded toward apex; labellæ large; vestiture of blackish-brown scales; cilia numerous particularly toward apex, where they are long. Palpi minute, almost hidden by the clypeus. Antennæ plumose, the shaft slender, the last two joints long, with long and abundant ciliation, the others rather short, somewhat thickened toward their bases, with basal whorls of long brown hairs and median whorls of short hairs; tori large, ocherous yellow. Clypeus large, prominent, triangularly rounded, smooth, shining, brownish. Occiput clothed with broad appressed scales, pale metallic blue in front, dark behind; setæ along margins of eyes long and coarse, black.

Prothoracic lobes prominent, well separated, clothed with broad, flat, pale metallic blue scales and a few black bristles. Mesonotum rich yellow-brown, with a median longitudinal dark brown stripe extending to antescutellar space; vestiture of scattered narrow blackish-brown scales with a bronzy luster and with coarse black bristles; a narrow median longitudinal stripe of broad metallic blue scales extending to antescutellar space; a short line of blue scales on the sides in front of roots of wings. Scutellum with central lobe large, broadly rounded, each lobe with a group of bristles; a large patch of broad, flat,

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metallic blue scales on mid lobe; some dark narrow scales on lateral lobes. Postnotum large, brownish ocherous, shining, nude. Pleuræ pale brownish-yellow with a large median dark spot covered by a patch of broad metallic blue scales; coxæ pale luteous.

Abdomen subcylindrical, somewhat expanded towards the tip, the segments with scattered coarse bristles, numerous on first segment and at apex; dorsal vestiture of blackish-brown scales, the third, fourth, and fifth segments with somewhat irregular apical bands of white scales; sixth segment with a few white apical scales; venter dark scaled, with obscure apical pale bands.

Wings rather narrow, hyaline; forks of second and fourth veins short; basal cross-vein upright, rectangular, distant about its own length from anterior cross-vein; scales of the veins small, clavate, dark brown, extreme apex and fringe paler; sparse, large, broadly lanceolate, outstanding pale scales along lower branch of second vein, outer half of third and upper branch of fourth; a short line of broad blue scales beginning at base of fourth vein and continued on fifth vein over less than the basal third.

Legs rather long and slender; vestiture blackish-brown marked with white; femora largely pale beneath; ends of femora with a silvery white patch; ends of tibiæ white marked, the hind ones very broadly so; front and middle tarsi obscurely banded, the bands involving both ends of the joints; hind tarsi with apex of first and base and apex of second joints narrowly white banded, third joint with narrow basal and broad apical white band, fourth joint white with median black ring, fifth joint entirely white. Claw formula, 0.0–0–0.0.

Length: Body 2.5 mm.; wing 2 mm.

Genitalia: Side-pieces short and broad, slightly longer than wide, tips conically rounded; basal lobe slight, low, setose. Clasp-filament as long as side-piece, emarginate on one side toward tip, which bears a small terminal claw. Harpe-like appendages a pair of stout rods with rounded tips. False harpagones divided into three stout curved teeth, the two inner ones borne on a common pedicel.

Female.—No specimens of this sex are before us.

Larva, Stage IV.—Head elongate, bulging at eyes, tapering anteriorly, front margin with a median excision and heavy spinose processes at its sides; eyes large; antennæ small, basally thickened, with a few small spinules; dorsal head-hairs apparently single and thickened (broken in the specimen); ante-antennal tufts small, multiple. Thorax subquadrate, flat. Abdomen with the segments widened posteriorly, the hairs in small tufts, long lateral hairs apparently single (broken). Lateral comb of eighth segment of five stout teeth on a plate, the upper and lower ones short, the central one long. Air-tube moderate, cylindrical, uniform, about five times as long as wide, with pecten of about twelve uniformly spaced small teeth, a moderate hair-tuft near the middle closely following the pecten; single pecten teeth with a delicate transparent fringe on the sides. Anal segment nearly twice as long as wide, uniform, ringed by the plate; dorsal tuft of a hair and large tuft on each side; a large lateral stellate tuft; ventral brush small, the tufts few-haired; anal gills broad, ensiform, not as long as the segment.

Professor Moore reared one of our specimens from larvæ found in one of the sweet water canals near Georgetown.

South America and Lesser Antilles.

Georgetown, British Guiana (H. W. B. Moore). Also reported from Argentina (Arribálzaga), States of São Paulo and Rio de Janeiro, Brazil (Peryassú), and Antigua, West Indies (Theobald).

Uranotænia pulcherrima varies in the thoracic ornamentation. One of our specimens, instead of the median line of metallic blue scales, shows only a patch

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of such scales in front of the scutellum and the dark integumentary stripe is also absent. This is the form described by Theobald from the island of Antigua under the specific name *apicalis*. He also reported the typical form from the same island. Our material, comprising both forms, is from British Guiana.

URANOTÆNIA LOWII Theobald.

Uranotænia lowii Theobald, Mon. Culic., ii, 339, 1901.
Uranotænia lowii Giles, Handb. Gnats or Mosq., 2 ed., 492, 1902.
Uranotænia lowii Theobald, Mon. Culic., iii, 301, 1903.
Uranotænia lowii Taylor, Rev. de Med. Trop., iv, 152, 161, 1903.
Uranotænia lõwii Pazos, Bull. Soc. Ent. France, 1904, 134, 1904.
Uranotænia lowii Lutz in Bourroul, Mosq. do Brasil, 65, 1904.
Uranotænia lowi Blanchard, Les Moustiques, 410, 1905.
Uranotænia lowii Grabham, Can. Ent., xxxvii, 401, 1905.
Uranotænia lowii Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 186, 1906.
Uranotænia lowii Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 26, 1906.
Uranotænia minuta Theobald, Mon. Culic., iv, 559, 1907.
Uranotænia lowii Theobald, Mon. Culicid., iv, 560, 1907.
Uranotænia lowii Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 246, 1907.
Uranotænia lowi Peryassú, Os Culicid. do Brazil, 257, 1908.
Uranotænia lowii Busck, Smith. Misc. Colls., quart. iss., iii, 62, 1908.
Uranotænia lowii Pazos, San. y Ben., ii, 49, 553, 1909.
Uranotænia lowii Aiken, Brit. Guiana Med. Ann., 1908, 14, 1909.
Uranotænia minuta Aiken, Brit. Guiana Med. Ann., 1908, 15, 1909.
Uranotænia lowii Newstead & Thomas, Ann. Trop. Med. & Par., iv, 147, 1910.
Uranotænia lowii Theobald, Mon. Culic., v, 502, 1910.
Uranotænia minuta Theobald, Mon. Culic., v, 503, 1910.

ORIGINAL DESCRIPTION OF URANOTÆNIA LOWII:

Head with two silvery-blue patches; thorax bright chestnut-brown, with two dark parallel median lines, a dark brown patch on each side over the roots of the wings, a shiny silvery spot at the root of each wing; metanotum dark brown in the middle, pale chestnut-brown at the sides. Abdomen dark brown, with traces of apical pearly-blue lateral spots. Legs brown, the last two and the apical half of the antepenultimate hind tarsi white. Wings with a patch of violet and mauve scales at base of the fifth long vein.

♀. Head dark brown, with deep brown flat scales over the occiput, a small patch of silvery-blue ones on each side; eyes black; antennæ deep brown, basal joint dark brown, second joint pale, rather swollen, verticillate hairs long and dark, joints all hairy; proboscis brown, much swollen apically and hairy towards the tip, densely brown-scaled.

Thorax bright clear chestnut-brown, darker in the middle, with two brown median parallel lines and with a dark brown patch over the roots of the wings, a small silvery-blue spot in front of the root of each wing, the mesonotum covered sparsely with very small, curved, black scales, and small black bristles over the roots of the wings and forming two distinct lines down the mesonotum; scutellum pale chestnut-brown, with flat black scales (partly denuded); metanotum deep brown in the middle, pale ochraceous-brown at the sides; pleuræ pale ochraceous.

Abdomen dark brown, with blackish-brown scales and pearly apical spots, showing pale blue at times; venter ochraceous.

Legs brown, the mid femora swollen, in the hind legs the last two and the greater part of the apex of the antepenultimate tarsal joints white; ungues small, equal and simple; in some lights the fore and mid tarsi appear pale in colour and rather shiny.

Wings with brown scales, the median ones small and truncated, in a single row, a few long thin lateral ones, scales at the base of the fifth, and a few at the base of the fourth metallic-blue in certain lights; first sub-marginal cell very small, the second long vein close to the first long vein, the stem passing some distance past the supernumerary cross-vein; second posterior cell larger than the first sub-marginal, but small; posterior cross-vein about its own length distant from the mid cross-vein, close to the base of the upper branch of the fifth long vein; halteres with an ochraceous stem and fuscous head.

Length.—1.5 mm.
Habitat.—St. Lucia.
Time of capture.—February.

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Observations.—Described from two specimens sent by Dr. Low to Dr. Rees. It is a very distinct species, which can be easily told by the thoracic ornamentation and the white hind tarsi. Dr. Low bred them from larvæ taken in a pool at the Cemetery, St. Lucia, and mentions that the larva is peculiar.

ORIGINAL DESCRIPTION OF URANOTÆNIA MINUTA:

Head deep brown in the middle, azure blue at the sides and in front.

Thorax dark brown in the middle, pale brown at the sides, with a patch of flat azure blue scales in front of the roots of the wings. Abdomen brown, some of the segments with apical lateral pale blue spots. Legs deep brown, the hind pair with the apical half of the third tarsal, whole of the fourth white and the fifth white in some lights, dusky in others. Wings with a pale blue patch at the base.

♀. Head deep brown, clothed in the middle with flat deep velvety-brown scales and with flat azure blue ones at the sides and a few forming a median patch in front; antennæ deep brown; also the proboscis, which is much swollen apically.

Thorax deep brown in the middle, bright brown at the sides, clothed with bronzy curved scales which are broader on the dark area than on the pale, a line of pale blue flat scales on each side in front of the roots of the wings, and pale blue scales on the prothoracic lobes, chætæ long, brown; pleuræ brown, with pale blue puncta; scutellum pale brown, with four border-bristles to the mid lobe (denuded).

Abdomen deep brown, with three (?four) apical pale blue lateral spots and short brown border-bristles.

Legs deep brown, with violet and purple reflections, in some lights bronzy; the hind legs have the apical half of the third tarsal, and whole of the fourth snowy-white, the fifth appears white in some lights, dusky in others; ungues equal and simple.

Wings with brown scales, the lateral ones scanty, long and thin, a line of flat azure-blue scales at the base of the fifth vein; median vein-scales single, very narrow; costa spiny, dark brown; first sub-marginal cell smaller and narrower than the second posterior, its base nearer the apex of the wing, its stem about three and a half times as long as the cell, close to the first long vein; stem of the second posterior not quite twice as long as the cell; the supernumerary vein longer than the mid and sloping backwards; the posterior as long as the mid, about one and a-half times its own length distant from it; joining the upper branch of the fifth at about its own length distant from the fork, the upper branch of the fifth bending sharply where it joins it; the wings are pale at the base; halteres with pale stem and fuscous knob.

Length.—2 mm.

Time of capture.—January.

Habitat.—New Amsterdam, British Guiana (Dr. Rowland).

Observations.—Described from a perfect ♀, except that the scutellum is rubbed. It is a very small species, easily told by the cephalic adornment, the white hind tarsals and non-banded abdomen, with apical pale blue scales. The blue area at the base of the wing is on the fourth and fifth veins. The antennæ appear very long.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF URANOTÆNIA LOWII:

Female.—Proboscis moderately long, apical third much dilated, labellæ large, entire length ciliate; vestiture of deep brown scales. Palpi very short, stout, clavate, with a few coarse long bristles and clothed with dusky scales. Antennæ filiform, long and slender, the joints subequal, with coarse but sparse ciliation; hairs of whorls rather short, sparse, black; tori globose, with an apical excavation, yellow and brown. Clypeus prominent, broadly conical, constricted at base, brown. Occiput clothed with flat recumbent black scales with a slight iridescence, in front a median triangular patch of bluish-silvery scales, on each side and contiguous with this a broad band of bluish-silvery scales runs from ocular margins obliquely to base of prothoracic lobes; bristles along margins of eyes coarse, black.

Prothoracic lobes large and prominent but well separated, contiguous with head, clothed with broad flat silvery scales with a bluish or violaceous iridescence and with a few black bristles. Mesonotum bright yellow-brown with three dorsal longitudinal darker stripes, two shining bare stripes between them showing a pale greyish or bluish tinge, at sides over roots of wings a large dark brown spot; vestiture of sparse, blackish, rather large hair-like scales; these

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scales densest over the three median and submedian integumental stripes, the median one extending to the antescutellar bare space, the submedian ones continuing on each side of it to hind margin; a short, broad line of bluish-silvery scales on lateral margins before roots of wings; bristles coarse and long, dark brown. Scutellum with the median lobe large and broadly rounded, lateral angles acute; a large patch of broad truncate dusky-brown outstanding scales at the middle and smaller similar patches at lateral angles; each lobe with few long, coarse, brown setæ. Pleuræ yellow-brown with a large median dark brown spot bearing a transverse patch of broad, flat bluish-silvery scales; coxæ luteous, with basal patches of bluish-silvery scales.

Abdomen short, subcylindrical, tip broadly truncate; dorsal vestiture of black scales; sides of third, fifth and sixth segments with very large, triangular bluish-silvery patches, their bases resting on posterior borders of segments; posterior margins of segments with dark brown bristles which are most abundant on last segment; venter entirely silvery-white scaled.

Wings moderate, hyaline; second vein very closely approximated to first, second marginal cell very short, about one-fourth the length of its petiole; second posterior cell larger but much less than its petiole in length; basal cross-vein long, about its own length from the short anterior cross-vein; scales of the veins brown, small; scaling in general slight, rather dense on costa and first vein; a few large, long and narrowly lanceolate outstanding scales on lower branch of second, on third vein and on upper branch of fourth vein, fourth vein with a short stripe of broad silvery-blue scales at its base, continued by a short stripe of similar scales on fifth vein in its basal fourth; fringe broad. Halteres with pale stem, the knobs pale brownish.

Legs rather long and slender; vestiture blackish-brown, with a slight bluish iridescence; femora pale beneath at base; knees, except the fore pair white; apices of tibiæ touched with white; hind tarsi with last two joints and apical half of second joint white; tips of middle tarsi with a pale brownish luster. Claw formula, 0.0–0.0–0.0.

Length: Body about 2 mm.; wing 2.1 mm.

Male.—Proboscis longer, more slender and less swollen at apex than in the female, with rather coarse outstanding setæ. Palpi very short, slender. Antennæ long, filiform, the joints subequal, but little shorter than in the female, the last two joints lengthened; hairs of whorls sparse, but longer than in the female; ciliation coarse. Coloration as in the female. Abdomen short, subcylindrical, somewhat thickened at apex. Wings slightly narrower, the fork-cells shorter than in the female; vestiture less abundant. Claw formula, 0.0–0.0–0.0; one claw of the mid legs very large, the other very small.

Length: Body about 2 mm.; wing 2 mm.

Genitalia (plate 37, fig. 248): Side-pieces about twice as long as broad, conically tapered; a low, strongly hairy lobe on inner side near base. Clasp-filament short, very stout, thickened outwardly, rounded at tip, with about fifteen terminal spines, arranged in a patch at tip and within it. False harpes short, slender, rounded at tip and curved outward. False harpagones divided into two portions, a stout rounded outer triangle and two small spines within. Unci forming a broad membranous plate with quadrate apical emargination.

Larva, Stage IV.—Head elongate, elliptical, widest through eyes, front protuberant, broadly rounded, shallowly emarginate at middle between a pair of stout projecting spines; both pairs of dorsal head-hairs single and thickened, finely spinose; ante-antennal tufts multiple. Antennæ small, stout, thickened at base, with a single hair below middle and a few small spicules; terminal spines large and stout. Air-tube subcylindrical, scarcely tapered, about five times as long as wide; pecten reaching nearly to middle, of twelve evenly spaced

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teeth, followed by a multiple tuft. Lateral plate of eighth segment large, elliptical, with comb of six to eight teeth along its posterior border. Anal segment longer than wide, ringed by the plate; plate spinose along posterior border; dorsal tuft of five long hairs on each side; lateral tuft small, multiple; ventral brush confined to barred area, rather small and sparse; anal gills short, equal, rather slender and with blunt tips.

Mr. Taylor has found the larvæ in Cuba most plentiful in September. He found them principally in small collections of clear, still water in conjunction with "*Culex*" and *Anopheles*. The eggs "are brownish in color, and are deposited on the surface of water in a manner similar to those of *Culex pipiens*, that is in a boat shaped mass, but both the group and the individual eggs are smaller. They average about 50 to 75 in a group." Mr. Taylor further remarks: "It is evidently a rural insect, and our observations would indicate that it is of very little annoyance to human beings. We have been unable to get it to bite in confinement. The minimum period of development from egg to mosquito was eight and a half days."

Mr. Jennings found the larvæ in shallow pools containing algæ in open grassy situations. Theobald quotes Dr. Low as saying: "The pool already mentioned near the cemetery in St. Lucia and small water holes in a meadow behind Kingstown, St. Vincent, were the breeding-ground of this species." Theobald further quotes Mr. Hewlett of Trinidad as saying that the adults bite severely, but the statement remains unconfirmed and is probably erroneous.

Tropical America, including the Antilles.

Havana, Cuba, October 3, 1901 (J. Carroll); Havana, Cuba, November 1, 1902 (J. R. Taylor); Kingston, Jamaica (M. Grabham); Laventille, Trinidad (F. W. Urich); Las Cascadas, Canal Zone, Panama, May 18, 1907 (A. Busck); La Boca, Canal Zone, Panama, November 19, 1907 (A. H. Jennings); Ancon, Canal Zone, Panama (A. H. Jennings); Culebra, Canal Zone, Panama, April 3, 1908 (A. H. Jennings); Miraflores, Canal Zone, Panama, December 10, 1908 (A. H. Jennings); Georgetown, British Guiana (E. D. Rowland); Berbice, British Guiana, November 12, 1906 (J. Aiken). Reported also from St. Vincent and St. Lucia, West Indies and Pará, Brazil (Theobald); city of São Paulo and Maceió, State of Alagôas, Brazil (Peryassú).

URANOTÆNIA CONTINENTALIS Dyar & Knab.

Uranotænia continentalis Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 186, 187, 1906.

ORIGINAL DESCRIPTION OF URANOTÆNIA CONTINENTALIS:

Sent to Miss Mitchell by Dr. Dupree from Baton Rouge, Louisiana, and identified as "*Uranotænia lowii* Theob." The characters are indicated in the table.

The following is an abstract of the table:

1. Antennæ with scattered spines; longest terminal seta shorter than antenna 2
2. Terminal setæ four..... 4
4. Antennæ with the hair beyond the basal third..... *continentalis*

DESCRIPTION OF FEMALE AND LARVA OF URANOTÆNIA CONTINENTALIS (MALE UNKNOWN):

Female.—Proboscis rather long and slender, apical third much swollen, setæ rather coarse; vestiture of dark bronzy-brown scales. Palpi very short, brown-scaled and with a few coarse bristles. Clypeus prominent, conical, constricted at base, brown, shining, nude. Antennæ filiform, the joints subequal, brown, very coarsely but rather sparsely ciliate; hairs of whorls sparse, rather long, black; tori globose, with an apical excavation, brown and yellowish, strongly white-pruinose. Occiput clothed with broad appressed scales, those on the

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vertex blackish with a slight iridescence, a large silvery-blue spot on vertex and laterally a broad line of silvery-blue scales runs from the eye-margins near vertex obliquely to bases of prothoracic lobes; bristles along margins of eyes coarse, black, two paler ones projecting forward between the eyes.

Prothoracic lobes large, prominent, remote dorsally, clothed with broad, flat bluish-silvery scales and with a few coarse dark bristles. Mesonotum bright yellow-brown, three dorsal longitudinal darker brown stripes, between them a pair of narrow, bare, pale plumbeous stripes, the outer dark stripes continued along sides of antescutellar space; a large, dark brown patch over roots of wings; vestiture of sparse, coarse, hair-like, dark brown scales, denser on dark portions; a short line of broad bluish-silvery scales at lateral margins before roots of wings; antescutellar space bare, very pale plumbeous; bristles coarse and long, brown. Scutellum brownish luteous, the mid lobe large, each lobe with a patch of broad dark-brown scales and a few coarse brown bristles. Postnotum elliptical, prominent, nude, ochraceous, with a broad median brown stripe. Pleuræ ochraceous, with a large dark-brown spot on middle, partly covered by a patch of broad, flat bluish-silvery scales; coxæ ochraceous, with patches of silvery-blue scales.

Abdomen subcylindrical, truncate at tip; dorsal vestiture dull black, the second, third, fifth, and sixth segments with very large patches of bluish-silvery scales on the sides; venter silvery scaled.

Legs long and slender; vestiture of blackish-brown scales; femora pale-scaled beneath on basal portion; knees and tips of tibiæ without white scales; hind tarsi with last two joints and outer half of third white-scaled. Claw formula, 0.0–0.0–0.0.

Wings moderate, hyaline; the second vein very close to the first, second marginal cell very short, about one-fourth the length of its petiole; second posterior cell slightly longer, but still much shorter than its petiole; basal cross-vein distant nearly its own length from anterior cross-vein; scales on veins small, brown, some long, narrow outstanding scales on lower branch of second, on third, and on upper branch of fourth veins, a short patch of broad bluish-silvery ones at base of fourth vein, a longer patch of similar scales in continuation on fifth vein, involving about its basal fourth.

Length: Body about 1.6 mm.; wing 1.5 mm.

Larva, Stage IV.—Head elongate, longer than wide, bulging at the sides, front margin with a median emargination and a sharp stout prominence each side of it, a deep notch at insertion of antennæ. Antennæ small, subcylindrical, stout, spined on one side, a single hair at basal third; four large unequal terminal spines and two digits on a process. Eyes moderate, pointed. Both pairs of dorsal head-hairs single, very stout and thick; a two-haired tuft below; ante-antennal tufts multiple, rather remote from antennæ. Mental plate rounded triangular, apical tooth rounded, short; six teeth on each side, the last three small. Mandible quadrangular, the area below dentition squarely exserted; four filaments before tip, two long, two smaller, with a dense group of hairs before the collar; cilia at edge supplanted by filaments; dentition heavy, two sets of teeth on a process, rounded, the first in each group longest, several irregular ones at base; exsertion below with hairs at tip; two long serrate filaments and a group of hairs within. Maxilla hemispherical, divided by a suture, hairy, outer half densely so; a group of serrate filaments at apex on the suture; two jointed filaments near base; palpus small, with seven digits of different lengths. Thorax rounded, wider than long; hairs abundant; short subdorsal tufts of mesothorax and metathorax short and stellate; subdorsal prothoracic tufts multiple. Abdomen moderate, anterior segments shorter;

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lateral tufts of first two segments long, multiple, obsolete on other segments; secondary hairs in distinct stellate tufts. Tracheal tubes slender, flexuous. Air-tube slender, uniform, about five times as long as wide; pecten of uniformly spaced small teeth, a large tuft at the middle beyond pecten; single pecten teeth narrow, tapered, fringed on the sides with spinules, the tip smooth. Lateral comb of eighth segment a row of scales on the edge of a large lateral chitinous plate, the single scales conical and fringed with long thick spines. Anal segment about as long as wide, ringed by the plate, which has a row of spines along posterior edge; dorsal tuft of three hairs on each side; a small lateral tuft; ventral brush moderately well developed, confined to barred area; anal gills short, about as long as the segment, tapered.

Life history and habits unknown.

Southern United States.

Baton Rouge, Louisiana, September 6-9 and October 23, 1904 (J. W. Dupree); Jackson Barracks, Louisiana, August (M. P. Chamberlain).

Uranotænia continentalis was founded on the larva, and, although the characters then indicated are without value, adults since received show that the species is distinct from *Uranotænia lowii*, but very closely allied thereto. In *continentalis* the two dorsal, mesonotal, bare pale stripes are much narrower than in *lowii*, the silvery-blue spot on the vertex is absent on most of our specimens and the femora and tibiæ are not marked with white, as they are in *lowii*.

URANOTÆNIA COATZACOALCOS Dyar & Knab.

Uranotænia coatsacoalcos Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 186, 1906.

ORIGINAL DESCRIPTION OF URANOTÆNIA COATZACOALCOS:

The antennæ are stout, with a single stout hair at basal third and two short spines on the other side; at tip two long hairs, not as long as the antennæ, a short one and a sharp angle; a long double blade-like digit that appears to be divided to the base, one part dark and about two-thirds as long as that longer pale portion.

The larvæ were collected by the junior author at Santa Lucrecia, Mexico, in the valley of the river Coatzacoalcos. They were not bred. The larvæ occurred in a ditch full of vegetation.

The following is an abstract of the table:

1. Antennæ with scattered spines; longest terminal seta shorter than antenna 2
2. Terminal setæ three, the short one obsolete..... 3
3. Shaft with but two spines; terminal digit double..... *coatsacoalcos*

DESCRIPTION OF LARVA OF URANOTÆNIA COATZACOALCOS (FEMALE AND MALE UNKNOWN):

Larva, Stage IV.—Head rounded, elongate, longer than wide, bulging at the sides, front margin with a slight median emargination and a stout sharp prominence each side of it, a deep notch at insertion of antennæ. Antennæ cylindrical, small and stout, basally thickened, with a few scattered spines and a single short hair at basal third; four large apical spines of irregular length and a stout digit with a basal branch. Eyes moderate, pointed. Both pairs of dorsal head-hairs single, very stout and thick; a two-haired tuft below; ante-antennal tufts multiple. Mental plate triangular, with a central tooth and five on each side, the last one small. Mandible quadrangular, rounded; four filaments and a large tuft of hairs before tip; a row of stiff cilia surrounding dentition; dentition of four teeth on a thick process, the second tooth much the largest; a small tooth and a larger double one at base, a broad plate with irregularly serrate edge and two slender filaments within; two delicate superposed hemispherical plates at basal articulation, serrate on the edge, fringed with hairs outwardly; a basal

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row of hairs. Maxilla slightly more than hemispherical, divided by a narrow suture; inner half hairy toward margin, with a row of long thick spines towards tip; a tuft of coarse serrate hairs at tip; outer half with two filaments near middle and a tuft of fine hairs; palpus short and thick, with four long apical digits and two short subapical ones. Thorax rounded, wider than long; hairs abundant, the short subdorsal tufts of the mesothorax and metathorax short and stellate. Abdomen moderate, anterior segments shorter; lateral tufts of first two segments long, multiple, evanescent on other segments; secondary hairs more or less in tufts. Air-tube slender, uniform, about five times as long as wide, pecten of short evenly spaced teeth, a multiple tuft before the middle beyond pecten; single tooth a flat scale with long serrations at side. Lateral comb of eighth segment a row of thorn-shaped scales with fine obscure spinules on the sides toward the base; lateral plates absent (specimens immature). Anal segment about as long as wide, ringed by the plate, which has a row of spines along posterior edge; dorsal tufts of three hairs on each side; a small lateral tuft; ventral brush moderately well developed, confined to barred area; anal gills about as long as anal segment, tapered.

The larvæ from which this species was described were collected from a reedy ditch along the railroad tracks near Santa Lucrecia on the Isthmus of Tehuantepec. These larvæ died.

Southern Mexico.

Santa Lucrecia, June 20, 1905 (F. Knab).

URANOTÆNIA BASALIS, new species.

DESCRIPTION OF MALE AND LARVA OF URANOTÆNIA BASALIS (FEMALE UNKNOWN):

Male.—Proboscis long, moderately slender, distinctly swollen apically, clothed with coarse black scales, labellæ rather large and broad with outstanding setæ. Palpi short and slender, nearly as long again as the clypeus, clothed with blackish scales and with a few setæ. Clypeus conical, rounded, constricted at base, dark brown, shining, nude. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others shorter, progressively longer towards apex, the proximal one about four times as long as wide, each joint with a basal whorl of abundant long brown hairs and a median whorl of short ones; tori large, subspherical, with a cup-shaped apical excavation, brown. Occiput clothed with broad appressed scales, those on the vertex brownish-black with iridescent luster, margin of eyes broadly white scaled, cheeks also white scaled; setæ along margins of eyes moderate, black.

Prothoracic lobes large and prominent, well separated dorsally, brown, with a broad oblique line of erect, broad silvery-white scales. Mesonotum dark brown, sparsely clothed with rather coarse, narrow curved, bronzy-brown scales, a pair of submedian longitudinal bare stripes not differentiated from rest of integument; a marginal line of very broad silvery-white scales from before root of wing to near middle of sides; bristles long, coarse, black. Scutellum dark brown, the median lobe prominent, clothed with small dark bronzy-brown scales, each lobe with a group of coarse black bristles. Postnotum elliptical, prominent, nude, dark brown, slightly pruinose. Pleuræ brown, a line of broad silvery-white scales crossing obliquely in continuation with that on prothoracic lobes; coxæ pale luteous, with a few whitish scales.

Abdomen subcylindrical; dorsal vestiture of dull black scales, a series of segmental broad basal creamy-white spots tending to form bands, no lateral spots; first segment broadly yellowish-white scaled in the middle, dark scaled at the sides, with many fine brownish hairs; venter with pale basal segmental bands; lateral ciliation of sparse coarse pale hairs.

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Wings rather narrow, hyaline; second vein close to first; second marginal cell short, much less than half the length of its petiole; second posterior cell a little longer, but also much shorter than its petiole; basal cross-vein distant more than its own length from anterior cross-vein; scales along veins small, pale brownish, those of costa blackish-brown; first vein with basal third creamy-white scaled; second and third veins, both forks of fourth, and upper branch of fifth with large outstanding broadly lanceolate scales. Halteres white, with black knobs.

Legs rather long and slender; vestiture of blackish-brown scales with bronzy luster, marked with white; femora pale-scaled beneath to near apex, their apices white scaled; hind tibiæ broadly white scaled at their apices; middle tarsi with last two joints and apex of third pale scaled with a metallic luster; hind tarsi with last two joints and outer half of third white-scaled. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Genitalia (plate 37, fig. 251): Side-pieces short and stout, less than twice as long as wide, tips rounded; basal lobe broad, low, setose. Clasp-filament stout, swollen beyond middle, with a minute terminal claw and short hairs on inner margin. False harpes small, tips pointed. False harpagones divided into several portions, the inner slender one with a long curved branch below its tip, the others short and recurved.

Type: No. 12259, U. S. Nat. Mus.

Larva, Stage IV.—Head elongate, elliptical, widest through eyes, tapering anteriorly, front prominently rounded, emarginate at middle; clypeal spines short but stout and prominent; antennæ small, with a single hair near base, and a few weak spinules; both pairs of dorsal head-hairs single and thickened; upper lateral hair short, double; lower tufts in fours; ante-antennal tufts multiple. Air-tube over four times as long as wide, scarcely tapered; pecten of about fifteen rather short, broad, evenly spaced teeth, reaching nearly to middle of tube, followed by a large multiple hair-tuft; single pecten-spines fringed on both sides, but with the fringes longer on one side. Lateral plate of eighth segment large, elliptical, with six closely set spinose comb-scales on its posterior border. Anal segment longer than wide, ringed by the plate, which is spined along its posterior border; dorsal tufts of five long hairs on each side; lateral tuft small, multiple; ventral brush confined to the barred area, rather sparse; anal gills four, equal, slender, about half as long as anal segment.

The larva was collected in a pool among rocks in a stream-bed, associated with *Anopheles pseudopunctipennis, Anopheles argyritarsis, Culex coronator, Culex derivator,* and an *Aëdes,* probably *Aëdes fluviatilis.*

Southern Mexico.

Córdoba. Larva collected January 9; adult issued February 2, 1908 (F. Knab).

URANOTÆNIA GEOMETRICA Theobald.

Uranotænia geometrica Theobald, Mon. Culic., ii, 247, 1901.
Uranotænia geometrica Giles, Handb. Gnats or Mosq., 2 ed., 489, 1902.
Uranotænia geometrica Lutz in Bourroul, Mosq. do Brasil, 65, 1904.
Uranotænia geometrica Brèthes, Anal. Mus. Nac. Buenos Aires, iv, 336, 1905.
Uranotænia geometrica Blanchard, Les Moust., 409, 1905.
Uranotænia geometrica Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 26, 1906.
Uranotænia geometrica Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 187, 1906.
Uranotænia geometrica Aiken, Brit. Guiana Med. Annual, 1906, 63, 1907.
Uranotænia (?) geometrica Theobald, Mon. Culic., iv, 565, 1907.
Uranotænia geometrica Autran, Anal. Dep. Nac. Hig., xiv, 30, 1907.
Uranotænia geometrica Busck, Smiths. Misc. Colls., quart. iss., iii, 61, 1908.

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Uranotænia geometrica Peryassú, Os Culicid. do Brazil, 51, 258, 1908.
Uranotænia geometrica Newstead & Thomas, Ann. Trop. Med. & Par., iv, 147, 1910.
Uranotænia geometrica Theobald, Mon. Culic., v, 501, 1910.
Uranotænia geometrica Brèthes, Bol. Inst. Ent. y de Patol. Veget., i, 44, 1912.

ORIGINAL DESCRIPTION OF URANOTÆNIA GEOMETRICA:

Thorax testaceous brown, with two more or less distinct paler parallel lines, covered with scattered thin bronzy-brown scales, with a light blue line before the roots of the wings, a spot in the middle near the bare space in front of the scutellum, and another blue spot on the mid scutellar lobe and pale blue prothoracic lobes, and also two blue spots on the head. Abdomen black, with apical median triangular white patches. Legs blackish, with apical white bands, the *last two hind tarsi being all white.*

♀. Head covered with flat black scales, rather ochraceous behind, and with brilliant blue ones at the sides and along the eyes; antennae brown, basal joint and base of the second joint bright clear yellow; palpi very small, brown scaled; clypeus deep rich brown, shiny; proboscis as long as the whole body, swollen at the apex, brown at the base, dull metallic green, then purple at the apex.

Thorax bright testaceous brown, with two paler parallel lines, somewhat darker between than at the sides, covered with scattered narrow deep bronzy scales, which under the microscope present a beautiful appearance; the middle of the scales appears as a dark line bordered with a narrow golden rim; in front of the roots of the wings is a long patch of brilliant pale blue flat scales, another exists in the middle line just before the bare space in front of the scutellum; there are also two rows of brown bristles; prothoracic lobes covered with flat bright blue scales; scutellum with a patch of flat blue scales to the middle lobe; narrow bronzy ones to the lateral lobes; four bristles on the median lobe and four on each of the lateral lobes like *U. pulcherrima;* pleuræ pale bright testaceous, with one large patch of pale blue flat scales and traces of a second smaller one, and with scattered brown bristles; metanotum pale yellowish-brown.

Abdomen steely-black, covered with dusky-black scales, the third to eighth segments with a median apical white triangular spot, the base of the triangle level with the posterior border of the segments, these spots show pale blue and pearly reflections in some lights, the posterior borders with small pale hairs; there are also pearly apical lateral spots; venter pale scaled.

Legs with the coxæ very pale ochraceous, with a few dark brown and pale golden bristles; bases and venter along the basal half of the femora pale ochraceous, apical half dark brown, with a pure white apical dorsal spot; fore tibiae, metatarsi and tarsi dark brown, the apex of the tibiae and metatarsi with a small white band, traces of the same on the apices of the first three tarsi; mid legs similar in colour to the fore legs, but the femora much enlarged, hind legs with the tibiae with a large white apical patch, metatarsi and first tarsal joint with a small white apical band, the second tarsal with a broad white apical band, the last two joints being pure white; ungues equal, thin and simple.

Wings with dark- and pale-brown scales, those on the veins spatulate, short and rather broad, single rowed, the lateral ones, where they occur, pale lanceolate and large; the costal border dark, with fine pointed narrow lanceolate scales along its free border; scales on the first, second, third, fifth and sixth longitudinals dark brown, those on the fourth pale brown, except at the fork, the root of the fifth is densely scaled with blue scales, with pale mauve reflections, forming a distinct blue line; on the fork-cells and on all the third vein are large lateral pale lanceolate scales; there is a very distinct incrassation forming a quasi-seventh vein; first sub-marginal cell much smaller than the second posterior cell, lying close to the first longitudinal vein, but its stem not so near as in the former species (*pulcherrima*); the stem three times as long as the cell; the junction of the supernumerary and mid cross-veins close to the base of the vein, but not nearly so close as in the former species; posterior cross-vein not quite its own length distant from the mid cross-vein. Halteres with a deep ochraceous stem and fuscous knob.

Length.—2.5 mm.

Habitat.—Cubatao, near Santos, Brazil (Dr. Lutz).

Observations.—Dr. Lutz sends me an *Uranotænia*, which he points out as differing from *U. pulcherrima* of Arribalzaga, and which he names *geometrica.* After carefully studying the two specimens sent and comparing them with *U. pulcherrima*, I feel convinced that Dr. Lutz is correct, although it is closely related to Arribalzaga's species. Dr. Lutz pointed out to me that the abdominal ornamentation differs, and also that the leg banding differs, the two last tarsal joints of the hind legs being pure white, whilst in *pulcherrima* the last only is white, the abdominal ornamenta-

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tion consists of apical triangular median white patches, not bands, as in *U. pulcherrima*. To these differences I must add the following: (i) there is no median blue thoracic line, but a blue median spot towards the scutellum; (ii) the dark thoracic scales have a golden border when seen under the microscope, whilst in *U. pulcherrima* they are all deep bronzy-brown, like *sapphirina;* (iii) the first submarginal cell is relatively much smaller than in *U. pulcherrima;* (iv) the basal blue-scaled line of the wings is present only on the root of the fifth vein, whilst in *U. pulcherrima* it is on both the fourth and fifth veins; (v) lastly, I can detect no upright forked scales on the head of *U. geometrica*.

I have not seen a ♂. Dr. Lutz says they breed with *Anopheles*, and the larvæ are much like those of that genus, but have a short respiratory tube, and lie obliquely in the water. They sting severely in the daytime, but do not seem very inclined to do so. They may also be found in the grass near the places where they breed.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF URANOTÆNIA GEOMETRICA:

Female.—Proboscis long, slender at base, much expanded toward apex, labellæ large; vestiture of black scales with a brownish tint; cilia numerous, particularly towards apex where they are longer. Palpi very short, rather stout, clavate; vestiture of blackish scales; setæ numerous, stiff, black and dense apically. Antennæ filiform, long and slender, the joints subequal, dark brown, with coarse and rather sparse ciliation, more dense on last two joints; second joint slightly longer than the succeeding one and broadly pale at base; hairs of whorls long and sparse; tori globose, rather small, ocher-yellow. Clypeus rather small, prominent, roundedly triangular, constricted at base, nude, dark brown, shining. Occiput covered with broad appressed dark iridescent scales, light metallic blue in a large vertical spot between the eyes and another laterally at ocular margins; bristles along margins of eyes moderate, black, a pair projecting forward between eyes.

Prothoracic lobes prominent, well separated, covered with small, broad, metallic bright blue scales and with a few black bristles. Mesonotum dull yellowish brown anteriorly, becoming dull brown on posterior half; vestiture of rather dense, small, curved, light bronzy brown scales, some black hair-like ones intermixed, a pair of submedian longitudinal bare lines extending from anterior margin to near antescutellar space, a small spot of metallic blue scales in front of antescutellar space; a broad line of metallic blue scales at lateral margins from base of wings to near middle of sides; bristles coarse and long, light brown with a slight golden luster. Scutellum with the central lobe large, broadly rounded, each lobe with a group of coarse brown bristles; scales on lateral lobes small, black, a large patch of blue ones on middle lobe. Postnotum large, deep ocherous, with a slight dark median ridge, smooth, nude. Pleuræ pale yellowish-brown, a darker spot bearing a patch of small pale metallic blue scales in the middle; coxæ luteous.

Abdomen straight-sided, dorsally flattened, truncate at tip; dorsal vestiture of black scales, in parts with brown, bright green and dark blue luster; a series of median, segmental, apical triangular white patches, absent on first segment, small on second, large and transverse on the following ones; sides with a series of silvery-white triangular apical segmental patches, with a slight bluish luster; venter clothed with dull white scales; tip of abdomen with many coarse brown bristles.

Wings rather narrow, hyaline; second vein closely approximate to first; second marginal cell very short, about one-third the length of its petiole; second posterior cell slightly longer, but much less than its petiole in length; basal cross-vein upright, distant about its own length from anterior cross-vein; scales of veins small, dark brown, with a green reflection along costa; extreme apex paler and also the fringe; a row of large broadly lanceolate outstanding pale scales along lower branch of second vein, outer two-thirds of third vein

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and upper branch of fourth vein; a short line of very broad metallic blue scales at base of fourth vein, continued on fifth vein over about basal fourth of wing. Halteres pale, with black knobs.

Legs rather long and slender; vestiture blackish-brown with a slight grecnish luster and marked with white; femora largely pale beneath, especially towards base; ends of femora with a large bluish-white patch above; ends of tibiæ white marked; fore tarsi with apex of first, both ends of second and base of third joint narrowly white-ringed; mid tarsi with faint bandings at all the joints; hind tarsi with last two joints entirely and apical fourth of third white; second and third joints banded at base and apex, first at apex only. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.2 mm.

Male.—Proboscis straight, rather long and slender, dilated toward apex, labellæ large; apical portion with a few coarse bristles; vestiture of dark-brown scales. Palpi short, stout, clavate, almost hidden by the clypeus. Antennæ plumose, slender; last two joints long and slender, brown, sparsely and coarsely ciliate, the others shorter, pale luteous with apical white rings and black rings at origins of basal whorls; hairs of basal whorls very long, yellowish-brown, secondary whorls short and sparse; tori large, pale yellowish. Coloration as in female. Abdomen somewhat longer than in the female, slightly thickened at apex; ciliation sparse, coarse and irregular, yellowish, more abundant towards tip. Wings narrower than in the female, the stems of the fork-cells about the same length, vestiture similar. Claw formula, 0.0–0.0–0.0, one of the claws of mid tarsi small and attenuated, the other large, broad and strongly curved.

Length: Body about 2.5 mm.; wing 2.2 mm.

Genitalia (plate 37, fig. 250): Side-pieces short and broad, slightly longer than wide, tips conically rounded; basal lobe slight, low, setose. Clasp-filament as long as side-piece, strongly enlarged just beyond base and tapering slightly to tip, which bears a minute terminal claw. Harpe-like appendages slender, tapering, tips rounded. Harpagone-like appendages divided into a number of stout basal teeth of equal length.

Larva, Stage IV.—Head elongate, rounded, bulging at sides, front margin with a sharp prominence each side of middle, a deep notch at insertion of antennæ. Antennæ small, subcylindrical, stout, smooth, a single hair at basal third; at tip four unequal coarse spines and a digit with a branch. Eyes moderate, pointed. Both pairs of dorsal head-hairs single, very stout and thick. Mental plate rounded triangular, with a triangularly pointed apical tooth and seven on each side, the basal one small. Mandible quadrangular, arcuate on outer side; four short filaments and a tuft of hairs in a hollow some distance before tip; a row of short stiff cilia surrounding dentition; dentition of two large teeth followed by four short ones on a process, a large double tooth below and another one near articulation; a broad, irregularly serrate plate and two slender filaments within; a small process at articulation bearing four teeth and a tuft of hairs; a row of long hairs at base. Maxilla hemispherical, divided by a curved suture; inner half densely hairy, with two long spines on margin; an area of thick short conical spines at tip; outer half with two long filaments at middle; palpus stout, as thick as half of maxilla, with four long digits on pedicels. Thorax rounded, wider than long; hairs abundant, short subdorsal tufts of mesothorax and metathorax short and stellate; subdorsal prothoracic tuft multiple. Abdomen moderate, anterior segments shorter; lateral tufts of first two segments long, multiple, short and multiple on the other segments; some of secondary hairs in series of distinct stellate tufts. Air-tube slender,

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subcylindrical, straight, about five times as long as wide; pecten of few, small, evenly spaced teeth, followed by a large tuft before middle; pecten teeth short, flat deeply serrate scales. Lateral comb of eighth segment a row of six scales on posterior margin of a very large lateral plate; single scales thorn-shaped, with a slight lateral fringe of spinules. Anal segment much longer than wide, ringed by the plate which has a row of spines along posterior edge; dorsal tufts of three hairs on each side; a small lateral tuft; ventral brush of few sparse branches, confined to the small barred area; anal gills short, about as long as the segment, tapered.

Theobald quotes Dr. Lutz as saying that he found the larvæ associated with the larvæ of *Anopheles*, which they much resemble. According to him the females bite severely by day, but seem not especially inclined to do so. Mr. Urich found the larvæ in a small puddle in a drain covered with green algæ. He says that the larvæ at first sight reminded him of *Anopheles argyritarsis*. They were colored green, no doubt from feeding on the algæ. The Rev. Dr. Aiken found the larvæ in a pool, associated with *Uranotænia pulcherrima* and *Uranotænia rowlandii*. Mr. Busck found the larvæ in a pool of a clear, cold, mountain brook. He says the larvæ look curiously like an *Anopheles* larva, but are furnished with a long tube. Mr. Jennings found the larvæ in a swampy pond with sedgy edges and tufts of grass. Mr. Knab took them in a water-hole between boulders in the stream-bed of the river San Antonio above the reach of ordinary high water. The pool was full of algæ. The larvæ, when disturbed, descended into the dense mass of algæ and remained there a long time. The pupæ also remained below for a long time; in spite of their long breathing trumpets they did not become entangled in the algæ. They were associated with larvæ of *Anopheles argyritarsis*.

Tropical America, exclusive of the Antilles.

Córdoba, Mexico, February 5, 1908 (F. Knab); Panama City, Panama (A. I. Kendall); Empire, Canal Zone, Panama, May 7, 1907 (A. Busck); Gatun, Canal Zone, Panama, June 8, 1907 (A. Busck); Culebra, Canal Zone, Panama, July 23, 1907 (A. Busck); Taboga Island, Panama (A. H. Jennings); Colon, Panama (A. H. Jennings); East La Boca, Canal Zone, Panama, November 12, 1907 (A. H. Jennings); Forty Mile Camp, Pedro Miguel, Canal Zone, Panama, November 20, 1907 (A. H. Jennings); Trinidad, West Indies (F. W. Urich); Stanley Town, British Guiana, September 18, 1905 (E. D. Rowland). Reported also from Santos and the city of São Paulo; Juiz de Fóra and Oliveira, both in the State of Minas Geraes; Manáos, State of Amazonas, Brazil (Peryassú); Buenos Aires, Argentina (Brèthes).

Uranotænia geometrica varies locally in the amount of white marking on the hind tarsi. In the Mexican specimens there is only the extreme tip of the third joint white; three females from Mexico have a black spot on the fourth tarsal joint towards its base. The color of the metallic scales varies in different specimens from a brilliant violet blue to a greenish blue.

URANOTÆNIA CALOSOMATA Dyar & Knab.

Uranotænia calosomata Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 200, 1907.
Uranotænia calosomata Busck, Smiths. Misc. Colls., quart. iss., lii, 61, 1908.
Uranotænia calosomata Theobald, Mon. Culic., v, 518, 1910.

ORIGINAL DESCRIPTION OF URANOTÆNIA CALOSOMATA:

Proboscis moderately long and slender, slightly enlarged apically; clypeus and tori dull brown; occiput brown scaled with two oblique lines of white scales, which converge upon the vertex and terminate in a white tuft; thorax deep brown, on the

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lateral margin a line of white scales to the base of the wing; pleura brown with a longitudinal stripe of white scales extending forward over the prothoracic lobe and joining the stripe on the head; metanotum brown. Abdomen black scaled at the sides, above clothed with ochreous yellow dull metallic scales, leaving a narrow black line at the base of each segment, becoming broader on the terminal segments, and a sub-basal median black spot; beneath with black vestiture and apical white bands, which are broadest on the centers of the segments. Legs black with bronzy and brassy luster, the apices of the femora white; on the hind legs the dilated apices of the tibiae have a patch of white scales; hind tarsi with the third, fourth and fifth joints white with metallic luster. Wings heavily dark-brown scaled on the costa, the basal third of the first vein white scaled, the two forked cells small but broad, the second posterior cell slightly longer than the second marginal cell.

Length, 2.5 mm.

Five specimens, Tabernilla, Canal Zone, Panama (August Busck, collector), bred from larvae in prints of horses' feet containing water.

Type.—No. 10866, U. S. National Museum.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF URANOTÆNIA CALOSOMATA:

Female.—Proboscis rather long and slender, distinctly enlarged towards tip; labellæ small, conical, luteous; vestiture of brownish-black scales. Palpi small, slender, about twice as long as the clypeus, clothed with dull brownish scales and with a few coarse setæ. Antennæ filiform, long, the joints subequal, rugose, coarsely pilose, brown; hairs of whorls sparse, moderate, black; tori subspherical, with a cup-shaped apical excavation, blackish-brown. Clypeus small but prominent, rounded triangular, convex, depressed at base, dark brown, nude. Eyes black. Occiput clothed with broad, flat, dull black scales and with very narrow erect black scales, a row of broad, flat white scales along margins of eyes; a tuft of very long and narrow white scales projecting forward between eyes; cheeks white scaled; bristles along margins of eyes long, coarse, black.

Prothoracic lobes elliptical, remote dorsally, with an oblique line of very broad white scales and some coarse black bristles. Mesonotum dark brown; sparsely clothed with small bronzy-brown hair-like scales which are denser in three longitudinal stripes on the disk separated by two narrow bare stripes, a marginal line of very broad silvery-white scales on anterior edge and along lateral margins to the roots of wings; bristles long and coarse, dark brown; pleurae dark brown, a narrow line of very broad silvery-white scales cross middle to base of abdomen in continuation of white line on the head and across prothoracic lobe, a few coarse blackish bristles; coxæ brownish luteous. Scutellum with the mid lobe prominent, dark brown, each lobe with a few long black bristles, the mid lobe with some minute dark scales. Postnotum elliptical, prominent, dark brown, nude.

Abdomen subcylindrical, dorsally flattened, truncate at tip; dorsal vestiture of small, dense flat scales, metallic pale ochraceous, a very narrow line of blackish ones at base of each segment, widening into a series of triangular spots at centers of segments; sides broadly black scaled; venter metallic dirty yellowish-white scaled; ciliation coarse and rather abundant beneath towards apex.

Wings rather narrow, hyaline; petiole of second marginal cell about three times as long as its cell, that of second posterior cell nearly twice as long as its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales on costa blackish brown, basal third of first vein clothed with clear white scales; veins with very small brown scales, outstanding scales on second, third, and forks of fourth veins large and broadly lanceolate. Halteres whitish, with black knobs.

Legs rather long and slender; vestiture dark brown with a bronzy reflection and marked with white; femora whitish beneath at base, tips of femora and tips of hind tibiæ narrowly silvery-white; hind tarsi with the last three joints

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silvery-white; front and mid tarsi with a brassy luster, particularly apically. Claw formula, 0.0–0.0–0.0.

Length: Body about 2 mm.; wing 2.5 mm.

Male.—Proboscis straight, long and enlarged towards apex. Palpi short, almost hidden by the clypeus. Antennæ plumose, rather long, the last two joints long and slender, brown, with long ciliation, the others much shorter, with large basal whorl and small whorl medianly; hairs of basal whorls very long, those of median ones short and sparser. Coloration as in the female. Abdomen more elongate than in the female; ciliation coarse, rather sparse, irregular, yellowish. Wings hardly narrower than in the female; venation about the same; scales along the veins larger and paler. Claw formula, 0.0–0–0.0.

Length: Body about 1.6 mm.; wing 1.8 mm.

Genitalia (plate 38, fig. 253): Side-pieces about twice as long as wide, tips conically tapered; basal lobes conical, similar in shape to side-pieces, setose at tips. Clasp-filament stout, expanded outwardly, excavated subapically, with a minute terminal tooth and articulated spine. False harpes slender, rod-like. False harpagones divided into a number of portions, the inner one furcate, the others forming loops and angles.

Larva, Stage IV.—Head elongate, broadly elliptical, widest through eyes, front margin arcuate, the clypeus emarginate and with stout prominent spines; antennæ small, moderately stout, nearly smooth, with a single hair near base; upper and lower pairs of dorsal head-hairs single, thickened, but rather slender, secondary pair well developed, double, ante-antennal tufts multiple. Air-tube subcylindrical, about four times as long as wide, slightly tapered on outer half, pecten reaching nearly to middle, of fine, closely-set, evenly spaced teeth, followed by a large multiple hair-tuft. A large lateral plate on eighth segment, with comb of nine pointed stout teeth on its posterior margin. Anal segment ringed by the plate which is spinose along posterior margin; dorsal tufts of five long hairs on each side; lateral tuft small, multiple; ventral brush of few and sparse rays, confined to the barred area; anal gills four, equal, very slender, about as long as the segment.

Mr. Busck says: "It was bred from deep hoof-prints in a swampy meadow. The larvæ are very elongate, with reddish body, deep black head, and comparatively short tube; they are easily overlooked, as they go down at the least disturbance and remain at the bottom for a long time, burrowing in the mud."

Panama.

Tabernilla, Canal Zone, May 2, 1907 (A. Busck).

The imago varies in the amount of white scaling on the basal part of the first vein of the wings; in the type series before us the white occupies from about one-fourth to nearly one-half the length of the vein.

URANOTÆNIA TYPHLOSOMATA Dyar & Knab.

Uranotænia typhlosomata Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 200, 1907.
Uranotænia typhlosomata Busck, Smith. Misc. Colls., quart. iss., lii, 62, 1908.
Uranotænia typhlosomata Theobald, Mon. Culic., v, 505, 1910.

ORIGINAL DESCRIPTION OF URANOTÆNIA TYPHLOSOMATA:

♂.—Proboscis long and slender, much swollen at the apex, black scaled; antennæ amply plumose; palpi very short, black scaled; occiput black scaled, the margins of the eyes broadly bluish-white scaled; mesonotum brown, with minute dark-brown scales; scutellum with metallic-blue scales, the setæ long, black; in front of the roots of the wings is a short stripe of silvery-blue scales and a similar blue stripe extending over the anterior half of the pleura and over the prothoracic lobes; metanotum dark brown; abdomen depressed, black scaled above and at the sides; legs black with bronzy luster, the knees with a minute silvery spot and at

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the apices of the hind tibiae another; on the hind tarsi the apical three fifths of the third and all of the fourth and fifth joints silvery white; wings black scaled along the costa, brown scaled on the veins, the base of the first vein with a patch of silvery scales, the fifth vein with a line of silvery scales close to the base. Length, 2 mm.

One specimen, Taboga Island, Panama (A. H. Jennings, collector), bred from larvae from pool in a small stream.

Type.—No. 10918, U. S. National Museum.

In the single specimen the thorax is somewhat denuded and it is possible that there may be a blue spot before the antescutellar space.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF URANOTÆNIA TYPHLOSOMATA:

Female.—Proboscis moderately long, slender basally, gradually expanded to tip; labellæ small, conical, with a few outstanding setæ; vestiture blackish-brown. Palpi very small, about twice as long as the clypeus, blackish-brown scaled and with some coarse dark bristles. Antennæ filiform, long, the joints subequal, rugose, brown, with very long pile; hairs of whorls sparse, moderate, black; tori rather small, subspherical, with a cup-shaped apical excavation, dark brown. Clypeus prominent, rounded triangular, convex, constricted at base, dark brown, nude. Eyes black. Occiput densely clothed with elliptical flat scales, black with a blue reflection, a few upright forked black ones, cheeks and a broad border along the eyes of broad white scales with a blue reflection; setæ along margins of eyes coarse, black, a pair projecting forward between eyes.

Prothoracic lobes prominent, well separated dorsally, clothed with brown scales and with a broad oblique stripe of broad bluish-white ones across the middle. Mesonotum dark brown and with indistinct large blackish-brown spots over roots of wings and on antescutellar space; sparsely clothed with small bronzy-brown hair-like scales, at sides a short row of broadly ovate white scales with bluish-silvery luster, from roots of wings halfway to anterior angles; bristles coarse and long, black. Scutellum dark brown, the mid lobe prominent, clothed with small blackish scales, each lobe with a few coarse black bristles. Pleurae luteous-brown with a large dark brown median spot, an oblique narrow stripe of elliptical white scales continuing that on prothoracic lobes and extending to base of abdomen. Postnotum elliptical, prominent, dark brown, nude.

Abdomen short, subcylindrical, dorsally depressed, broadly truncate at tip; dorsal vestiture brownish-black with a metallic blue or bronzy reflection; venter dull greyish-white scaled; ciliation coarse and rather abundant, pale brownish.

Wings rather broad, hyaline; petiole of second marginal cell over twice as long as its cell, that of second posterior cell distinctly longer than its cell; basal cross-vein distant nearly twice its own length from anterior cross-vein; veins with small pale-brown scales, those on costa and first vein blackish with a blue reflection, a few outstanding, large, broadly elliptical, very pale scales on second, third, and forks of fourth veins; a short line of broadly elliptical silvery-white scales at base of fourth and continued by a longer line of similar scales on fifth vein over its basal third. Halteres whitish, with black knobs.

Legs rather long and slender; vestiture brownish-black with a blue or bronzy reflection; femora whitish beneath; hind tarsi with apical two-thirds of third, all of fourth and fifth joints white. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.2 mm.; wing 2.4 mm.

Male.—Proboscis straight, moderately long, slender basally, distinctly enlarged towards apex. Palpi very short, projecting slightly beyond clypeus. Antennæ plumose, rather long, the last two joints long and slender, rugose, brown, with long pile, the other joints shorter, elongate, subcylindrical, brown, with black rings at insertions of hair-whorls; a basal whorl of very long brown

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hairs and a median one of small hairs. Coloration as in the female. Abdomen subcylindrical, more elongate than in the female, with many coarse yellowish bristles distally. Wings narrower than in the female, the stems of fork-cells longer, vestiture about the same. Claw formula, 0.0–0.0–0.0; one claw of the mid legs very large, the other minute, setiform.

Length: Body about 2 mm.; wing 2 mm.

Genitalia (plate 38, fig. 254): Side-pieces about twice as long as wide, conically tapered, basal lobe small, setose. Clasp-filament nearly as long as the side-piece, stout, thickened above the middle, with a minute terminal claw. False harpes slender, concave, margins slightly recurved, tip pointed. False harpagones with a broad triangular base, shaft slender, recurved, divided into a number of slender lamellæ.

Larva, Stage IV.—Head elongate, elliptical, bulging at eyes, front arcuate; clypeus medianly emarginate and with a pair of stout prominent spines; antennæ small and stout, with coarse spines, a single hair near base; both pairs of dorsal head-hairs single, stout, spine-like; ante-antennal tufts multiple. Lateral hairs of first and second abdominal segments long and stout, on succeeding segments fine, short and multiple; subdorsal hairs in ample tufts. Air-tube subcylindrical, about five times as long as wide, slightly tapered; pecten of about sixteen rather long, sharp, evenly spaced teeth reaching nearly to middle, closely followed by a large multiple tuft. Lateral plate of eighth segment large, with comb of eleven or twelve stout sharp teeth along posterior margin. Anal segment with a chitinous ring, spinose along its posterior border; dorsal tufts of five long hairs on each side; lateral tuft small, multiple; ventral brush long but of few hairs, confined to barred area; anal gills four, equal, moderate, not as long as anal segment, pointed.

Mr. Jennings found the larvæ in a still pool in a small stream and in holes along this stream, which were more or less open crevices under rocks, inhabited by crabs, about a quarter of a mile from the beach, at a good elevation. The adult mosquitoes were hiding in large crevices among the rocks in the immediate vicinity of the holes. The water was fresh.

Panama.

Taboga Island, Panama Bay, April 27, 1908 (A. H. Jennings); Caldera Island, Porto Bello Bay, January 3, 1908 (A. H. Jennings).

A good series of *Uranotænia typhlosomata* before us shows that the imaginal coloration is constant and agrees with the type; there are no bluish scales on the disk of the mesonotum.

URANOTÆNIA ANHYDOR Dyar.

Uranotænia anhydor Dyar, Proc. U. S. Nat. Mus., xxxii, 128, 1907.

ORIGINAL DESCRIPTION OF URANOTÆNIA ANHYDOR:

A single larva was collected in a swamp full of reeds at Sweetwater Junction, near San Diego, which died before reaching home. Mr. Caudell and I made a special trip to the swamp later to get more larvae, but it had gone dry, leaving little puddles of dying fish and a great quantity of *Anopheles* larvæ, all of which no doubt died within twenty-four hours.

Larva.—Head rounded, scarcely longer than wide, neck circular, the occiput oblique, roundedly angled at the side, then nearly straight, the front margin broadly, squarely truncate; labrum deeply excavate each side of the middle, forming a triangular horn-like prominence in the middle and one on each side, midway between the central one and the antennæ. Eyes large, semicircular, transverse; two approximate multiple hair tufts above and within the eye, another on the lower part of the front on each side; a large multiple tuft about base of antennæ. No trace of the usual thick, club-like hairs; if they are broken, the insertions are not visible. Antennæ small, not exceeding the mouth brush, conically tapered on basal two-thirds, a few spines within, a single hair at about the basal third; four terminal digits, all along and pointed, nearly equal. Deep brown, nearly black, lighter at the margins of the eyes. Thorax nearly circular in outline, flattened; a minute double

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prothoracic subdorsal tuft, a larger lateral 2-haired tuft from a tubercle and a subventral tuft; mesothorax with a minute multiple subdorsal tuft in the disk, a large lateral one from a small, thorn-shaped tubercle and a large subventral tuft; metathorax with the subdorsal tuft many-haired and long but very fine, lateral tuft with four feathered hairs and a simple one from a thorn-like tubercle. Abdomen submoniliform, rather slender; a single long lateral hair on the first segment, two on the second, from large tubercles, the subdorsal hairs fine and stellate; on segments 3 to 8, the hairs are fine, in substellate bunches, but long, as long or longer than the diameter of the body, both subdorsal and lateral. Lateral comb of the 8th segment an irregularly quadrangular plate, reaching near the dorsal line, the nine short teeth set on its posterior edge on the lower two-thirds, thorn shaped, with fine lateral feathering; a single hair and two tufts behind the plate, the upper with a large tubercle. Air tube straight and not tapered, four times as long as wide, light brown, with a narrow black basal ring; a single tuft slightly before the middle, from a raised tubercle, just beyond the pecten, which has 16 teeth, broad, finely feathered, pallid. Anal segment ringed by the plate, about as long as wide, the chitinous ring excavated below to admit the short ventral brush; the brush has few tufts and is surrounded by a narrow chitinous band which joins the ring on the ventral line; a fringe of fine spines on the posterior edge of the plate. Dorsal tuft, a group of long hairs on each side. Anal gills small, slender, about as long as the segment, apparently four in number.

Type.—Cat. No. 10010, U. S. N. M.

DESCRIPTION OF LARVA OF URANOTÆNIA ANHYDOR (FOR DESCRIPTION OF FEMALE, MALE, AND PUPA SEE APPENDIX, PAGE 1041):

Larva, Stage IV.—Head elongate, elliptical, bulging at eyes; front prominent, the clypeus large, with a median emargination and a short stout spine on either side of it; antennæ rather small, subcylindrical, slightly thickened basally, scarcely spinous, with a single hair near base; dorsal head-hairs not thickened, the upper pair a tuft of three fine hairs, the lower pair a single coarse long hair; lesser lower tufts in fours, short; ante-antennal tufts multiple, well developed. Lateral abdominal hairs long and coarse on first and second segments, fine, multiple and short on the succeeding ones; subdorsal series in tufts. Air-tube about five times as long as wide, scarcely tapered; pecten of fifteen evenly spaced spines not reaching middle of tube, followed at middle by a large multiple hair-tuft. Lateral plate of eighth segment with an angular projection below and comb of nine sharp teeth on its posterior border, those near the center longer than the others. Anal segment longer than wide, ringed by the chitinous plate, which is spinose along its posterior margin; dorsal tufts of three long hairs on each side; ventral brush long but sparse, confined to the barred area; anal gills four, equal, very slender, not as long as anal segment.

A single larva was obtained in a swamp full of reeds, associated with *Anopheles occidentalis, Anopheles pseudopunctipennis, Culex tarsalis,* and *Culex erythrothorax.*

Southern California.

Sweetwater Junction, June 2, 1906 (Dyar and Caudell).

Group MEGARHININES.

Genus MEGARHINUS Robineau-Desvoidy.

Megarhinus Robineau-Desvoidy, Mém. Soc. d'Hist. nat., iii, 403, 412, 1827.
Megarhinus Latreille in Cuvier, Regne Anim., 2 ed., v, 439, 1829.
Megarhinus Latreille, Les Crustac., Arachn. et Ins., ii, 439, 1829.
Culex Macquart, Hist. Nat. Ins., Dipt., i, 33, 1834.
Megarhina Macquart, Dipt. Exot., i, 1, 32, 1838.
Megarhina Walker, List Dipt. Brit. Mus., i, 1, 1848.
Megarhina Osten Sacken, Smiths. Misc. Colls., xvi, 1, 1858.
Megarrhina Osten Sacken, Smiths. Misc. Colls., xvi, 2 ed., 18, 1878.
Megarrhina Skuse, Proc. Linn. Soc. N. S. Wales, 2 Ser., iii, 1720, 1889.
Megarhina Lynch Arribálzaga, Rev. Mus. de la Plata, i, 372, 375, 1891.
Megarrhina Townsend, Trans. Am. Ent. Soc., xix, 149, 1892.

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Megarhina Giles, Handb. Gnats or Mosq., 119, 1900.
Megarhinus Theobald, Journ. Trop. Med., iv, 234, 1901.
Toxorhynchites Theobald, Journ. Trop. Med., iv, 234, 1901 (without species).
Toxorhynchites Howard, Mosquitoes, 155, 235, 240, 1901.
Megarhinus Howard, Mosquitoes, 235, 240, 1901.
Megarhinus Theobald, Mon. Culic., i, 215, 1901.
Toxorhynchites Theobald, Mon. Culic., i, 244, 1901.
Megarhina and *Toxorhynchites* Giles, Handb. Gnats or Mosq., 2 ed., 265, 278, 1902.
Megarhinus and *Toxorhynchites* Neveu-Lemaire, Mém. Soc. Zool. France, xv, 206, 207, 1902.
Megarhinus and *Toxorhynchites* Neveu-Lemaire, C. R. Soc. Biol. Paris, liv, 1330, 1902.
Megarhinus and *Toxorhynchites* Theobald, Mon. Culic., iii, 113, 119, 1903.
Ankylorhynchus Lutz in Bourroul, Mosq. do Brasil, 53, 65, 1904.
Megarhinus Lutz in Bourroul, Mosq. do Brasil, 53, 64, 1904.
Lynchiella Lahille, Act. y Trab. 2 Congr. Med. Latino-Americano, ii, 13, 1904.
Megarhinus and *Toxorhynchites* Blanchard, Les Moust., 220, 229, 1905.
Ancylorhynchus Blanchard, Les Moust., 626, 1905.
Megarhinus Dyar, Proc. Ent. Soc. Wash., vii, 45, 46, 1905.
Megarhinus Theobald, Gen. Ins., Dipt., 26me fasc., 12, 1905.
Toxorhynchites Theobald, Gen. Ins., Dipt., fasc., 26, 13, 1905.
Worcesteria Banks, Philippine Journ. Sci., i, 779, 1906.
Megarhinus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 178, 1906.
Megarhinus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 14, 1906.
Megarhinus Dyar & Knab, Smithson. Misc. Coll., quart. iss., xlviii, 241, 1906.
Megarhinus Howard, Osler's Modern Medicine, i, 372, 1907.
Megarhinus Autran, Anal. Dep. Nac. Hig., xiv, 9, 1907.
Megarhinus, *Ankylorhynchus* and *Toxorhynchites* Theobald, Mon. Culic., iv, 126-127, 1907.
Megarhinus Dyar & Knab, Can. Ent., xxxix, 48, 1907.
Megarhinus and *Ankylorhynchus* Peryassú, Os Culic. do Brazil, 33, 1908.
Megarhinus Williston, Man. No. Am. Dipt., 3 ed., 107, 1908.
Megarhinus Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 48, 1908.
Teromyia Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 48, 49, 1908.
Toxorhynchites Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, pt. 3, 48, 59, 1908.
Megarhinus, *Ankylorhynchus* and *Toxorhynchites* Theobald, Mon. Culic., v, 88, 1910.
Worcesteria Theobald, Mon. Culic., v, 110, 1910.
Toxorhynchites Edwards, Bull. Ent. Res., iii, 2, 1912.

The type species are: Of *Megarhinus* Robineau-Desvoidy, *Culex hæmorrhoidalis* Fabricius; of *Toxorhynchites* Howard, *Megarhinus rutila* Coquillett; of *Toxorhynchites* Theobald, *Toxorhynchites brevipalpis* Theobald; of *Ankylorhynchus* Lutz, *Culex violaceus* Wiedemann; of *Lynchiella* Lahille, *Culex hæmorrhoidalis* Fabricius; of *Worcesteria* Banks, *Worcesteria grata* Banks; of *Teromyia* Leicester, *Teromyia acaudata* Leicester.

GENERIC DIAGNOSIS OF ADULT:

Proboscis rather long, tapering to a fine apex, rigid, curved downward. Palpi in the male long and acuminate, upcurved; in the female of different lengths in different species, long and stout in the American species, shorter in the Old World species, in a few American species similar to those of the male. Antennæ filiform in the female, delicate, the joints subequal, the second longer and thickened, with median hair-whorl, the other joints with basal whorls of moderately long sparse hairs, interrupted on side towards palpi; densely plumose in the male, the shaft stout and rigid, with the second joint long and stout and the last two joints long and slender. Eyes contiguous above and beneath in both sexes. Prothoracic lobes prominent but well separated. Mesonotum without setæ on the disk. Scutellum collar-like, not lobed. Postnotum nude. Abdomen subcylindrical in the female, rather obtusely tapered at the tip; more elongate in the male, expanded and depressed towards the apex. Wings narrow; second marginal cell very short; second posterior cell much shorter than its petiole. Legs rather long, slender, the claws simple in the female, toothed and unequal in the male. The species are large and are remarkable for the brilliant metallic colors of their scale covering. Some species have tufts of long modified scales at the sides of the last two or three abdominal segments.

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GENERIC DIAGNOSIS OF LARVA:

Head rounded subquadrate, slightly longer than wide, not widened laterally, produced in front into two stout conical lobes which bear the mouth-brushes; eyes inconspicuous. Antennæ small, slender, smooth, the small hair tuft situated near the tip. Mouth parts modified for the predaceous habit; mouth brushes a series of ten large chitinous lamellæ, hooked at the ends, inserted beneath apices of anterior lobes and folded together; mandibles dentate; maxillæ broadly quadrate. Thorax flattened, circular, the lateral hairs few, short, thick and inserted on chitinous tubercles. Abdominal segments laterally angularly expanded, with abundant hairs, the lateral tufts inserted on small chitinous plates. No lateral comb on the eighth segment, but a chitinous plate. Air tube moderate or short, smooth, without pecten, a single pair of hair tufts situated towards the base. Anal segment short, ringed by a chitinous band with posterior fringe of spines; ventral brush well developed, confined to barred area. Anal gills generally very short and equal. Some of the body hairs very much thickened and spinulose. The color of the body is more or less of a dull dark crimson. In some species the skin shows iridescent colors.

Tropics of both hemispheres, particularly in forested regions. In North America one species penetrates northward along the Atlantic coast and up the Mississippi valley.

There are three divisions of the genus of perhaps subgeneric value indicated by differences in the palpi of the female and conditioned by geographical areas. *Megarhinus* proper, with the palpi of the female long and blunt, inhabits America, being best developed in the tropics and giving rise to *Ankylorhynchus,* which has the palpi long and acuminate in both sexes, in the southern part of that area; *Worcesteria,* with the palpi of the female short, is the Old World development, well represented in the Indo-Australian region.

The species were at first included under *Culex,* but very early recognized as distinct, the term *Megarhinus* being proposed by Robineau-Desvoidy as early as 1827. Practically all subsequent authors have accepted this genus, which has only lately been divided on differences in the palpi in one or the other sex, Theobald proposing *Toxorhynchites* in 1901 for Old World forms with the palpi of the female short and Lutz proposing *Ankylorhynchus* in 1904 for South American forms with the palpi of the female acuminate, as in the male. Theobald intended *Toxorhynchites* for the Old World species, but Howard first published the name, mentioning only the American *Megarhinus rutila* Coquillett, which thus becomes the type and makes the name strictly synonymous with *Megarhinus.* The use of *Toxorhynchites* by Theobald and others for the Old World species is therefore erroneous. If it be desired to designate the forms with short palpi by a separate name, *Worcesteria* Banks is available. These divisions are based on too trifling characters to be recognized as valid genera, and the names can only be recognized for subgeneric groups. The genus is a decidedly specialized one. It was raised to subfamily rank, by Theobald in 1901 (Mon. Culic., i, 215), a course unquestioningly adopted by most subsequent authors. Later, the genus *Toxorhynchites* was independently made a separate subfamily by Lahille in 1904 (Toxorhynchina, Actas y Trab. 2 Congr. Latino-Amer., ii, 11, 16) and Theobald in 1905 (Toxorhynchitinae, Gen. Ins., Dipt. 26 fasc., 13). Furthermore the names Ankylorhynchae and Megarhininae were introduced by Lutz (Bourroul, Mosq. do Brasil, 53, 1904) and Lynchiellina by Lahille (Actas y Trab. 2 Congr. Med. Latino-Amer., ii, 11, 13, 1904). These names are only a transitory expression of the general over-valuation of characters in the Culicidæ, which has arisen in the minds of uncritical writers following the remarkable attention that these insects have received since their rôle in the transmission of disease has been discovered.

The species of *Megarhinus* are, so far as known, exclusively predaceous in the larval state. They inhabit water in hollow trees, broken bamboos or leaves of bromeliaceous plants and feed upon the larvæ of such other species of mosquitoes

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as inhabit these situations. The proboscis sheath of the imago is strongly chitinized and the mouth-parts are therefore unfit for piercing. Neither larvæ nor adults are closely allied to any of the other genera, but in many points come nearest to the genus *Orthopodomyia*. It is a curious fact that it is the larvæ of the species of *Orthopodomyia* that are the principal food of the *Megarhinus* larvæ, perhaps the exclusive food of the more generalized species, the ones inhabiting hollow trees. We are inclined to think that they are actually related, the *Megarhini* having been derived from *Orthopodomyia*-like ancestors, rather than that they resemble them from convergence due to sharing the same habitat. The reason is that there are several other exclusively tree-inhabiting forms that do not possess the characters that the *Megarhinus* and *Orthopodomyia* larvæ share in common. In fact this derivation implies a lesser break in the evolution, supposing some originally tree-inhabiting *Orthopodomyia* to have acquired the predaceous habit against another species in the same habitat, than that some species not addicted to trees should invade this domain.

Agassiz and Scudder cite the date 1825 for the tipulid genus *Megarhina* of Le Pelletière de Saint Fargeau and Serville (Encycl. Meth., X, pt. 2, 585), which, if correct, would invalidate *Megarhinus* Robineau-Desvoidy as used here. The true date, however, is 1828 and in fact a note in the Encyclopédie Méthodique asserts that Desvoidy's name has precedence. This permits us to use the name in the present sense.

The eggs are laid singly, floating on the surface of the water. E. E. Green in Ceylon has come the nearest of any author to observing oviposition. He says (in the case of *M. immisericors* Walker): "The actual operation of egg-laying was not seen, but the female was observed jerking itself up and down in the air just above the water, and it seems probable that the eggs were shed at that time" (Spolia Zeylanica, ii, 160, 1905). A. D. Hopkins discovered a number of eggs on the surface of water in a rain-barrel (in the case of *M. septentrionalis* Dyar & Knab, Proc. Ent. Soc. Wash., vii, 4, 1905). The eggs are covered with coarse irregular spinose tubercles which entangle air and enable the egg to float. Green describes the eggs (of *M. immisericors*) as roundedly elliptical, uniformly spinous; Goeldi describes them (*M. hæmorrhoidalis* Fab.) as much elongate, fusiform, irregularly truncate at one end, densely granular for only two-thirds of the surface toward the pointed pole (Os Mosquitos no Pará, p. 124, pl. N. figs. 114–117, 1905). It seems, however, that his description and figures were made from collapsed egg-shells. Dr. Hopkins's specimens before us appear to have been originally regularly rounded, though they are much distorted in the preserved state and rolled up into an elongate shape such as indicated by Goeldi.

The larvæ are entirely predaceous in habit, feeding on the larvæ of certain other mosquitoes that with them inhabit water in holes in trees, broken bamboos, at the leaf-bases of bromeliads and in similar situations. *M. septentrionalis*, with which we are best acquainted, seems to be addicted to *Orthopodomyia signifer*, though *Aëdes triseriatus* inhabits similar holes in the same region and may be also a victim. The larvæ will eat any mosquito larvæ offered them and even each other, but they seem to thrive best on the one species, and often fail to be reared in captivity from the lack of the favorite food. Under favorable conditions the larvæ of some species also occur in water barrels and other wooden receptacles and even in metallic ones. They are never found in any pools or rain puddles on the ground. The prey is seized with great quickness and swallowed alive as rapidly as possible, the struggles of the victim causing an appearance of ferocious activity, like a dog shaking a rat. Green observes that the larvæ are dangerous to each other, and where more than one larva exists

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in a location, only the strongest survives. Hibernation (where it is necessary for climatic reasons) appears to take place in the last larval stage.

The adults fly by day, as indeed their brilliant colors would seem to imply, and are strictly sylvan. There is a diversity of opinion about their feeding habits and some authors state that they suck blood. Green could not induce his species to bite, but James is quoted as stating that they bite severely. These observations must, however, be in error, as the females are incapable of biting, their mouth-parts being adapted for sucking the juices of flowers only and not for piercing the skin. This is evidenced by the peculiar tapering shape of the proboscis, the heavily chitinized rigid sheath and its bent condition, adapted for lapping, and seen in no other mosquito. The genus was in fact originally founded on this character, which, as it represents a fundamental difference in habit, was therefore a good generic character. Mr. Urich has observed both sexes feeding upon the nectar of flowers and informs us that these otherwise rare insects can always be found when sought on flowers.

The larvæ must destroy enormous numbers of other mosquito larvæ, but as they attack principally species of no economic importance and are reckless and wasteful in their habits by destroying each other, their value as beneficial species is lessened. No observations have been made on the mating habits beyond the fact that the males congregate upon certain bushes, apparently for sexual purposes.

Tables of the Species.

Adults, markings, and coloration.

1. Abdomen with latero-apical tufts..... 2
   Abdomen without tufts..... 3
2. Abdomen with red tufts..... *superbus* Dyar & Knab (p. 932)
   Abdomen with tufts whitish and black..... *violaceus* Wiedemann (p. 936)
3. Female with the last four front tarsal joints white. *grandiosa* Williston (p. 939)
   Female with at least the last front tarsal joint dark..... 4
4. Mid and hind legs in part yellow, black at the joints; body green *longipes* Theobald (p. 939)
   Legs black, with or without white; body metallic blue..... 5
5. Male with white on front tarsi..... *rutila* Coquillett (p. 940)
   Male with no white on the front tarsi..... 6
6. Male with white on one side of the mid tarsi..... 7
   Male with no white on the mid tarsi..... 9
7. Male with white on third and fourth joints of mid tarsi and fourth joint of hind tarsi 8
   Male with white on second joint of mid tarsi and on fourth and fifth joints of hind tarsi..... *trinidadensis* Dyar & Knab (p. 943)
8. Thorax with yellowish median and lateral stripes *septentrionalis* Dyar & Knab (p. 946)
   Thorax with blue stripes..... *moctezuma* Dyar & Knab (p. 950)
9. Male with no white on the legs..... *guadeloupensis* Dyar & Knab (p. 954)
   Male with white on the fourth joint of the hind tarsi..... 10
10. Male with the outer side of joints 4–5 of the hind tarsi white *hypoptes* Knab (p. 956)
    Male with the fourth joint white ringed, the fifth black *portoricensis* von Röder (p. 958)

Adults, females only.

1. Abdomen with red apical tufts..... *superbus* Dyar & Knab (p. 932)
   Abdomen with tufts mostly black..... *violaceus* Wiedemann (p. 936)
   Abdomen without tuftings..... 2
2. All the tarsi white-marked..... 3
   Mid and hind tarsi white-marked..... *guadeloupensis* Dyar & Knab (p. 954)
   Hind tarsi only white-marked..... *portoricensis* von Röder (p. 958)
3. Joints 2, 3 of front and mid tarsi white-marked..... 4
   Joints 2, 3, 4 of front and mid tarsi white-marked..... 6
   Joints 2, 3, 4, 5 of front and mid tarsi white-marked. *grandiosa* Williston (p. 939)

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4. Thorax marked with contrasting colors..... 5
   Thorax green-scaled on the disk..... *trinidadensis* Dyar & Knab (p. 943)
5. Thorax with yellowish median and lateral stripes
   septentrionalis Dyar & Knab (p. 946)
   Thoracic stripes blue..... 7
6. Abdomen beneath all golden..... *longipes* Theobald (p. 939)
   Abdomen with blue median area beneath..... *rutila* Coquillett (p. 940)
7. Last two hind tarsal joints all white..... *hypoptes* Knab (p. 956)
   Last hind tarsal joint partly black..... *moctezuma* Dyar & Knab (p. 950)

ADULTS, MALES ONLY.

1. Abdomen with red anal tufts..... *superbus* Dyar & Knab (p. 932)
   Abdomen with black and yellowish anal tufts..... *violaceus* Wiedemann (p. 936)
   Abdomen without tuftings..... 2
2. All tarsi without any white..... *guadeloupensis* Dyar & Knab (p. 954)
   Some or all of the tarsi white-marked..... 3
3. All of the tarsi white-marked..... *rutila* Coquillett (p. 940)
   Mid and hind tarsi white-marked..... 4
   Hind tarsi only white-marked..... 6
4. Joint 4 only of hind tarsi white..... 5
   Joints 4 and 5 of hind tarsi white..... *trinidadensis* Dyar & Knab (p. 943)
5. Thorax with yellowish median and lateral stripes
   septentrionalis Dyar & Knab (p. 946)
   Thoracic stripes blue..... *moctezuma* Dyar & Knab (p. 950)
6. Hind tarsi white-marked on one side only..... *hypoptes* Knab (p. 956)
   Hind tarsi white-marked all around..... *portoricensis* von Röder (p. 958)

ADULTS, MALE GENITALIA.

1. Basal lobes small, approximate, with a deep emargination between
   superbus Dyar & Knab (p. 935)
   Basal lobes large, remote, with a straight or at most shallowly emarginate connection between..... 2
2. Clasp filament long; unci long, produced to slender points, dentate within
   portoricensis von Röder (p. 961)
   trinidadensis Dyar & Knab (p. 945)
   guadeloupensis Dyar & Knab (p. 955)
   hypoptes Knab (p. 958)
   Clasp filament shorter; unci shorter and stouter
   septentrionalis Dyar & Knab (p. 949)
   rutila Coquillett (p. 942)
   moctezuma Dyar & Knab (p. 953)

We possess no male specimens of *violaceus* Wiedemann, *grandiosa* Williston, and *longipes* Theobald.

TABLE OF THE LARVÆ.

1. Integument of body showing iridescent colors.... *violaceus* Wiedemann (p. 938)
   Integument of body without iridescence..... 2
2. Chitinous parts yellow..... *superbus* Dyar & Knab (p. 935)
   Chitinous parts deep brown.....

The following species are so similar that we are unable to give any safe characters for their separation: *septentrionalis* Dyar & Knab (p. 949); *moctezuma* Dyar & Knab (p. 953); *portoricensis* von Röder (p. 961); *guadeloupensis* Dyar & Knab (p. 955); *trinidadensis* Dyar & Knab (p. 945); *hypoptes* Knab (p. 958).

The larvæ of *grandiosa* Williston, *longipes* Theobald, and *rutila* Coquillett are unknown.

MEGARHINUS SUPERBUS Dyar & Knab.

Megarrhina hæmorrhoidalis Osten Sacken (in part, not Fabricius), Cat. Dipt. N. Amer., 2 ed., Smiths. Misc. Colls., xvi (No. 270), 18, 1879.

Megarrhina hæmorrhoidalis Williston (not Fabricius), Biol. Cent. Amer., Dipt., i, 224, 1901.

Megarhinus hæmorrhoidalis Howard (not Fabricius), Mosquitoes, 152, 240, 1901.

Megarhinus violaceus Dyar & Knab (not Wiedemann), Journ. N. Y. Ent. Soc., xiv 178, 179, 1906.

Megarhinus violaceus Coquillett (not Wiedemann), U. S. Dept. Agr., Bur. Ent., Tech. Ser. No. 11, 14, 1906.

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Megarhinus superbus Dyar & Knab, Smithson. Misc. Coll., quart. iss., xlviii, 247, 248, 255, 1906.
Megarhinus superbus Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 12, 1907.
Megarhinus superbus Busck, Smiths. Misc. Colls., quart. iss., lii, 60, 1908.
Megarhinus hæmorrhoidalis Pazos (in part, not Fabricius), San. y Benef., ii, 46, 185, 1909.
Megarhinus hæmorrhoidalis Theobald (in part, not Fabricius), Mon. Culic., v, 92, 1910.
Megarhinus superbus Theobald, Mon. Culic., v, 602, 1910.
Megarhinus superbus Knab, Psyche, xviii, 82, 1911.
Megarhinus superbus Picado, Bull. Scient. France et Belg., 7 Sér., xlvii, 296, 1913.

ORIGINAL DESCRIPTION OF MEGARHINUS SUPERBUS:

Male.—Head metallic blue and green with scattered coppery scales. Antennae densely plumose; second segment as long as the following three and slightly thicker, its crest densely clothed with coarse, erect blue and golden scales. Palpi metallic—part violet-blue and coppery red, all but the last golden beneath. Third and fourth segments of equal length, the second slightly shorter, the fifth as long as the third and fourth together.

Prothoracic lobes bright blue. Mesothorax denuded on the disc, the remaining scales, particularly towards the sides and behind, golden-green and olivaceous, the extreme lateral margins bright blue; hind margin bright green. Patches over the roots of the wings brilliant blue. Scutellum silvery blue. Pleurae and coxae silvery white. Abdomen: first segment silvery, a patch of blue in the middle; second segment green, the following ones steel blue and purple to deep golden; the gold begins on the fourth segment and is diffused over the entire surface of the much dilated sixth and seventh segments; eighth segment violet; genitalia covered with deep blue scales. Sixth segment with a few reddish hairs at the hind angles; seventh and eighth segments with lateral fringes of brilliant red hairs, particularly ample on the seventh segment; the preceding segments with the usual scattered, pale yellow, lateral hairs. Beneath golden along the sides, the median area steel blue; eighth segment entirely blue. Legs steel blue and reddish purple. Femora and hind tibiae golden beneath.

Female.—Coloration of head and thorax as in the male. Antennae: second segment 1½ times as long as the third, hardly stouter, a small crest of erect scales on the basal half. Palpi violet blue and coppery red, golden beneath; fourth segment longer than second, third much longer than fourth.

Abdomen: first segment bright silvery at the sides, pale blue in the middle; second segment green, the third blue and purple, the succeeding ones purplish red and bright coppery—the latter shade predominating on the sixth, seventh and eighth segments; front angles of segments 2–8 bright blue; hind angles of segments 2–6 broadly golden. No lateral tufts—a few red hairs at the sides of the seventh segment. Beneath entirely pale golden.

Legs steel blue and coppery red. Femora and hind tibiae golden beneath. On the middle pair of legs the second tarsal segments is marked with silvery blue on the inside, visible only in certain positions.

Length, 4–6 mm.

Type No. 9957, U. S. N. M.

Localities: Trinidad (F. W. Urich), Frontera, State of Tabasco, Mexico (Townsend).

2 ♂, 1 ♀. The Mexican specimen, a male, shows, none of the golden scales on the abdomen which is mostly blue and purple. In the other specimen the golden scales have the appearance of being loosely attached and easily rubbed off. Mr. Urich's two specimens were bred from Bromelias, where the larvæ prey on those of *Wyeomyia*. The male was but recently received. The female formed the basis for Mr. Coquillett's diagnosis of *M. violaceus* and we have characterized the larva under that name.

It is evident that the three male specimens reported from Atoyac in the state of Vera Cruz (Mexico) by Williston, and doubtfully referred by him to *hæmorrhoidalis*, belong to the present species. His criticism of Wiedemann's description of *hæmorrhoidalis* and his statement that the red hairs of the tuft "are confined to the tip of the sixth and the sides of the seventh segments" proves this beyond a doubt.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF MEGARHINUS SUPERBUS:

Female.—Proboscis curved, tapering gradually to tip; vestiture dark with iridescent reflection. Palpi long, about two-thirds the length of the proboscis; terminal joint minute, outer part of long joint nearly half as long again as

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basal part, penultimate joint slightly shorter than outer part of long joint and with stout apical bristles; vestiture black, the scales showing bright blue and violet reflections, the tip, the constriction of the long joint and its apex pale violet; beneath covered with coarse brassy scales. Antennæ filiform, delicate, shorter than the palpi, the joints subequal, the second longer and thickened, with dorsal crest of erect scales on basal half; hairs of whorls moderate, sparse, black; tori small, black, with dense silvery gray pruinosity. Clypeus not prominent, transverse, nearly quadrate, hardly produced at middle; black, covered with silver-gray pruinosity. Occiput covered with appressed broad steel-blue scales, ocular margins light violet-blue; cheeks and head beneath silver scaled.

Prothoracic lobes large and prominent, covered with broad brilliant blue scales and bearing a few coarse black hairs. Mesonotum covered on the disk with a mixture of green and bronze scales, lateral margins, particularly at bases of wings, with brilliant light blue and and greenish scales; hind margin bright green scaled. Scutellum covered with brilliant pale-blue scales. Postnotum deep brown, slightly pruinose, nude. Pleuræ and coxæ brown, densely covered with silvery-white scales.

Abdomen subcylindrical at base, beyond the second segment depressed and much broadened with a trace of a median ridge; dorsal vestiture of metallic scales, those of first segment silvery at the sides, medianly light blue and green; second segment olive green, third green basally, blue apically, fourth blue basally, violet apically, fifth, sixth and seventh segments violet with strong coppery luster, eighth segment blue; the second to sixth segments bear lateral apical silvery spots with a slight yellowish tinge, the spots on fourth, fifth, and sixth segments very large and occupying outer third of segment; seventh segment with a pair of smaller sublateral silvery spots; seventh segment with brilliant red tufts along apical two-thirds of lateral margins; venter silver scaled with a slight brassy luster and a narrow dark blue median longitudinal line.

Wings narrow; basal cross-vein oblique, reaching fourth vein slightly beyond anterior cross-vein; costa blue and violet scaled, the veins with small subtruncate brown scales. Halteres stout at base, stem very slender below the knob; knob black, silver scaled above.

Legs deep blue and purple scaled; middle pair with second and third tarsal joints silver-blue scaled dorsally; all the femora brassy scaled beneath; hind tibiæ brassy scaled beneath. Claw small, formula 0.0–0.0–0.0.

Length: Body about 7 mm.; wing 5 mm.

Male.—Proboscis curved, tapering gradually to tip, slightly longer than in the female. Palpi long, longer than the proboscis, long joint stout and nearly two-fifths the length of entire palpus, about two-fifths from its base a marked constriction, having the appearance of a true joint; penultimate joint about three-fifths the length of preceding one; last joint about as long as preceding, slender, slightly curved and tapering to a point; vestiture of dark metallic blue and violet scales, false joint and apices of all but the last segment with pale violet scales; beneath all but the last joint brassy scaled except at the segmentations, where they are black. Antennæ densely plumose; second joint long and stout, slightly compressed, nearly three times as long as succeeding one, with a dorsal crest of broad erect metallic scales; succeeding joints short and stout, gradually diminishing in size towards apex, the last two joints long and very slender; tori moderate, black, with silvery-gray pruinosity. Clypeus rather small, almost quadrate, produced into a pointed lobe at middle, black, covered with silvery-gray pruinosity. Abdomen slender, subcylindrical, broadened somewhat to the apex of sixth segment, fifth and succeeding segments depressed; dorsally the color of the vestiture passes from metallic green and blue

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through violet and purple to a brilliant coppery-bronze on sixth and seventh segments, eighth segment deep blue, purple scaled in middle; apical half of lateral margin of sixth segment and lateral margins of seventh and eighth segments with a long fringe of brilliant red ciliate scales of silky luster; the usual lateral hairs of abdomen present on the preceding segments but sparse and very delicate; claspers purple scaled, with a few coarse black hairs; venter golden scaled at sides, a median longitudinal stripe steel blue. Wings narrow, with a smoky tinge along costal area; basal cross-vein oblique, reaching fourth vein just behind anterior cross-vein. Halteres stout at base, the knobs bearing silvery scales. Legs dark blue and purple, the femora and hind tibiæ brassy beneath. Claw formula, 1.0–1.0–0.0.

Length: Body 7 to 8 mm.; wing 4.5 mm.

Genitalia (plate 37, fig. 247): Side-pieces over twice as long as wide, much tapered to tips, conically rounded; a low conical basal lobe bearing setæ similar to those on side-pieces. Clasp-filament long and slender, as long as side-piece, smooth, with a long articulated terminal spine. Harpes large, concave, margin revolute, tips bent outward and pointed. Unci long, tapered to sharp points, tips shortly recurved, basal part dentate within. Basal appendages small, rounded, rather approximate, with a deep emargination between, each bearing four setæ.

Larva, Stage IV (plate 127, fig. 442).—Head subquadrate, longer than wide, sides nearly straight, insertion of antennæ rather prominent; front margin deeply emarginate at middle, produced on each side of it into a large prominent lobe. Antennæ cylindrical, slender, rather long, smooth; three hairs separately at outer third; a terminal hair and two digits on pedicels. Mental plate broadly trilobed and with irregular teeth; central portion with a median tooth and four on each side, lateral portions of five teeth, roundedly prominent. Mandible rounded-quadrangular, small, but with very large dentition; two numerously divided filaments before tip; a row of cilia from a collar overlapping the dentition, which consists of five large teeth, third shorter than the others; a slight irregularity below; a row of long basal hairs. Maxilla quadrate, inner third roundedly produced; outer margin with long spines, inner ones on the prolongation curved outwardly; a long spine from a tubercle in middle of outer portion; palpus long, with five minute apical digits. Thorax rounded, about as wide as long; lateral hairs short, very stout, the heaviest ones spinulose. Abdomen stout, the segments angled at the sides, anterior ones narrow and transverse; hairs abundant but not long. Skin pale; chitinized parts yellow. Eighth segment with a large plate on the sides. Air-tube rather slender, slightly tapered, over four times as long as wide; a single tuft at basal fifth. Anal segment as long as wide, ringed by the plate; dorsal tufts of five long hairs on each side; ventral brush well developed, of coarse ciliate hairs, confined to barred area; anal gills very short.

The larvæ live in the water held by the leaf-bases of epiphytic Bromeliaceæ and feed upon the other mosquito larvæ in such situations. Mr. Knab found them associated with *Wyeomyia abebela, Culex rejector,* and *Culex stenolepis,* the *Wyeomyia* much in the minority, and again with larvæ of *Culex* and Psychodidæ, the *Wyeomyia* being absent, probably all devoured by the *Megarhinus.* Mr. Busck found them feeding upon *Wyeomyia circumcincta,* while *Wyeomyia scotinomus* and *Culex jenningsi* were also present. The adults are diurnal and feed upon the nectar of flowers. Mr. Busck saw specimens flying in the tree-tops while he was collecting the larvæ, and Dr. Wise has captured specimens on the wing at 4 p. m. Mr. Urich has found both sexes feeding upon the nectar of the flowers of *Eupatorium odoratum* during the middle of the day.

Forested regions of tropical America from southern Mexico to Guiana and probably Brazil; Cuba.

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Córdoba, Mexico, March 21, 1908 (F. Knab); Omealca, State of Vera Cruz, Mexico, April 16, 1908 (F. Knab); Frontera, State of Tabasco, Mexico, June 3 (C. H. T. Townsend); Bluefields, Nicaragua (W. F. Thornton); Orosi, Costa Rica, 1200 meters, December to February (C. Picado); Tabernilla, Canal Zone, Panama, July 10, 1907 (A. Busck); Tabernilla, Canal Zone, Panama, February 4, 1909, larva from pineapple-like plant in bush (A. H. Jennings); Frijoles, Canal Zone, Panama, April 19, 1908 (A. H. Jennings); near Georgetown, British Guiana (H. W. B. Moore); Hyde Park, British Guiana (H. W. B. Moore); Siparuni Creek, Essequibo River, British Guiana (K. S. Wise); Arima, Trinidad, January 12, 1906 (F. W. Urich); Sangre Grande, Trinidad (F. W. Urich); Cuba (Riehl).

We have examined two males and one female from Cuba, now in the collection of the Museum of Comparative Zoology, Cambridge, Massachusetts, which were the specimens referred to by Osten Sacken under the name *hæmorrhoidalis*, and find them to be *superbus*. These two species are closely allied, but *hæmorrhoidalis* is a larger species and has the anal red tuftings involving one more segment than in *superbus*. The females of *hæmorrhoidalis* also have the hind tarsi as well as the mid ones marked with white, while in *superbus* only the mid ones are so marked. We have received *Megarhinus hæmorrhoidalis* from British Guiana, but as yet no specimens from our territory, although it will very likely be found in some part of it, especially Trinidad.

The white markings on the mid tarsi of *superbus* vary in distinctness, being usually obscure and bluish, but in some specimens from the Canal Zone they are of a rather distinct white, visible without the aid of a lens. The red tuftings on the abdomen are more easily lost in the female than in the male, so that most captured female specimens are largely or wholly without them, which may easily lead to an error in diagnosis.

MEGARHINUS VIOLACEUS (Wiedemann) Giles.

Culex violaceus Wiedemann, Dipt. Exot., 7, 1821.
Culex violaceus Robineau-Desvoidy, Mém. Soc. Hist. Nat. Paris, iii, 403, 1827.
Culex violaceus Wiedemann, Aussereurop. zweifl. Ins., i, 3, 1828.
Megarhina (?) *violacea* Giles, Handb. Gnats or Mosq., 132, 1900.
Megarhina (?) *violacea* Giles, Handb. Gnats or Mosq., 2 ed., 278, 1902.
Megarhinus mariæ Bourroul, Mosq. do Brasil, 3, 1904.
Megarhinus violaceus Blanchard, Les Moustiques, 229, 1905.
Megarhinus mariæ Blanchard, Les Moustiques, 625, 1905.
Megarhinus mariæ Theobald, Mon. Culic., iv, 129, 1907.
Megarhinus mariæ Peryassú, Culic. do Brazil, 42, 138, 1908.
Megarhinus mariæ Theobald, Mon. Culic., v, 92, 1910.
Megarhinus iris Knab, Ins. Insc. Menstr., i, 35, 1913.

ORIGINAL DESCRIPTION OF CULEX VIOLACEUS:

Chalybeus thorace fusco, abdominis lateribus auratis, tarsis absque albedine. Longit. lin. 3⅔. ♂. Bahia in Brasilia.

A praecedente [*Culex splendens*] differt magnitudine, thorace fusco magis quam griseo et tarsis unicoloribus.

ORIGINAL DESCRIPTION OF MEGARHINUS MARIÆ:

Comprimento (sem a tromba) 10 a 11 mm., tromba 7 mm., azas 5 mm.

Tromba. Delgada, preta; em baixo, na metade basal, com muitas escamas brilhantes douradas, azues e vermelhas.

Palpos. Menos de ⅔ da tromba, com 3 articulos compridos, sendo o primeiro pouco mais da metade do segundo, que é egual ao terceiro. Estão cobertos de escamas brilhantes: em cima, azues, e roxas; em baixo, douradas com o apex dos segmentos violaceo.

Clypeus. Com fundo escuro e brilho branco, como tambem os toros das antennas.

Antennas. Menores que os palpos, tendo apenas a metade da tromba; o flagello e os verticillos, escuros, quasi negros; e com muitos pellos finos e aneis articulares, esbranquiçados; o segundo segmento com escamas na metade basal.

Occiput. Com muitas escamas escuras, mas irisadas em verde, azul celeste, roxo, branco e dourado e alguns pellos escuros com brilho de ouro.

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Lobos prothoraxicos. Com pellos e escamas como no occiput, prevalecendo nas ultimas o azul celeste.

Mesonotum. Côr de ouro escura, tirante ao olivaceo e limitada na metade posterior por uma fita azul, lateral, que se estende sobre o scutellum; as escamas são fusiformes ou obovaes, compridas, densamente aggrupadas mas bastante salientes, dispostas como as pennas de um passaro; no meio são escuras, mas iriantes, prevalecendo o dourado ao lado do verde e azul celeste; na fita mencionada prevalece o azul celeste e verde claro.

Pleuras. Ochraceas, com brilho dourado e escamas branco-nacaradas.

Scutellum. Com pellos dourados e escamas bastante salientes, prevalecendo as de brilho azul celeste.

Metathorax. Nú, ochraceo, com brilho de ouro.

Abdomen. Em cima, o 1º segmento com brilho azul celeste esverdeado, o resto azul-violaceo escuro. No microscopio veem-se sobre o fundo preto as escamas obovaes ou espatuladas, densamente aggrupadas: (como as pennas de um passaro) e irisadas nas côres já mencionadas. No apex do sexto segmento ha lateralmente pellos dourados, escuros no setimo, formando um appendice lateral. No oitavo ha pellos dourados terminaes. O nono segmento pouco visivel e de côr dourada. Em baixo prevalecem as escamas douradas e prateadas, havendo uma fita mediana violacea. O fundo é pardo escuro, quasi preto no sexto e setimo segmentos.

Pernas. De côr uniforme, menos a face ventral dos femora que é de côr de ouro; o resto é violaceo com reflexos azues e vermelhos. As quatro unhas anteriores são um pouco maiores do que as posteriores.

Azas, encolhidas no apex do ramo posterior da quinta nervura—comprida; 1ª cellula forqueada muito curta e estreita, tendo o seu comprimento apenas a quarta parte do pedunculo; na segunda cellula forqueada a relação é de 1 para 2; as nervuras transversaes *b* e *c* formam um angulo muito obtuso aberto para o apex; *a* está, cerca de 4 vezes o seu comprimento mais perto da base. As escamas das veias longitudinaes são espatuladas, mais ou menos escuras, mas iriantes em ouro, roxo e azul.

NOTA:—Esta especie é um Megarhinus typico, que tem o 3º articulo dos palpos femininos rombo com pellos terminaes.

Este mosquito parece-se muito, na coloração, com o Megarhinus solstitialis, porém é maior e muito mais robusto, e a côr de ouro é mais carregada. A distincção principal entre as femeas das duas especies está na falta ou presença de uma faxa ventral clara no tarso do meio.

As larvas differem muito mais, sendo a de solstitialis toda vermelha e a do M. Mariæ vermelha com manchas, madreperolas e verdes no thorax.

Distingue-se do *trichopygus*, descripto por Wiedemann e Theobald, que é um ankylorhynchus e que tem terceiro articulo dos palpos da femea ponteagudo; além disso apresenta algumas outras differenças. O *portoricensis* não tem appendices lateraes, ficando assim excluido. Criado, por nós, de agua de bromeliaceas da Ilha de Itaparica (Estado da Bahia).

ORIGINAL DESCRIPTION OF MEGARHINUS IRIS:

Female: Palpi over three-fourths the length of the proboscis; terminal segment minute, the penultimate upturned, subtruncate, with a number of stout, projecting terminal bristles; vestiture of metallic violet and mauve scales, golden beneath and above at base and constriction of longest joint. Occiput clothed with flat iridescent blue, green and purplish scales; cheeks silvery white scaled.

Prothoracic lobes bright metallic blue. Mesonotum clothed with small dark olivaceous brown scales with blue, green and purple reflections, a patch of brilliant blue scales over the roots of the wings; bristles over the roots of the wings black. Scutellum bright metallic blue scaled.

Abdomen dorsally metallic violet-blue, basally brighter and with greenish reflections, the apices of the segments with crimson luster; segments with large, lateral, basal, rounded yellowish-silvery spots, visible from above; small yellowish white lateral tufts at apical angles of sixth segment, large dull black lateral tufts involving apical half of seventh segment and all of the sides of the eighth segment; apical bristles of ninth segment pale; venter yellowish-silvery with median dark line.

Wings small, narrow, with typical venation.

Legs dark violet-blue scaled, the femora silvery yellowish-white scaled beneath nearly to apices; tibiae and tarsi unmarked. Claws simple.

Trinidad, West Indies (F. W. Urich).

Type: Cat. No. 15603, U. S. Nat. Mus.

Described from a single female reared by Professor Urich from a larva found in water held by an epiphytic bromeliad. The body of the larva showed iridescent colors.

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Evidently closely related to *Megarhinus violaceus* Wiedemann, described from the State of Bahia, Brazil, but does not agree with the description of that species in several details. In that species the lateral tufts of the sixth segment are said to be golden and there is no mention of the abdominal lateral silvery spots, so conspicuous in the specimen before me.

Description of Female and Larva of Megarhinus violaceus:

Female.—Proboscis curved, tapering gradually to tip; vestiture bronzy black. Palpi long, over three-fourths the length of the proboscis; terminal joint minute, penultimate joint about half the length of long joint, with a few scattered short bristles and terminally with a number of very stout bristles, long joint with a constriction considerably before the middle; vestiture of brilliant violet and blue scales, beneath and dorsally at the constriction of the long joint golden scaled. Antennæ filiform, delicate, the joints subequal, the second longer, slightly thicker and with a dorsal crest of small raised scales; hairs of whorls moderate, sparse, black; tori small, black, with silvery gray pruinosity. Clypeus not prominent, transverse, hardly produced at middle, black, silvery gray pruinose. Occiput covered with appressed broad metallic blue scales with violet and green iridescence; cheeks dull silvery scaled.

Prothoracic lobes lateral, large and prominent, covered with brilliant metallic blue scales. Mesonotum covered with dark olivaceous brown scales with blue, green and purple reflections, a patch of brilliant blue scales over the roots of wings; bristles over roots of wings black. Scutellum covered with bright metallic blue scales and with coarse brown marginal bristles. Postnotum ocher yellow, shining, nude. Pleuræ and coxæ dull brown, densely clothed with silvery white scales.

Abdomen subcylindrical, depressed outwardly, truncate at tip; dorsal vestiture of deep metallic blue scales, on basal segments with a slight greenish tinge, numerous scattered brilliant violet-red scales, particularly on apical margins of segments and on distal ones upon the disk, a series of large subquadrate yellowish-silvery spots laterally at bases of second to seventh segments, the first segment broadly silvery at the sides; a tuft of pale yellowish hair-scales at the sides of the sixth segment and involving its distal half, a lateral tuft of black hair-scales involving distal two-thirds of seventh and base of eighth segments; venter pale yellowish-silvery scaled, with a median dark line.

Wings narrow; second marginal cell very small, second posterior cell about one-third the length of its petiole; basal cross-vein oblique, more than its own length before anterior cross-vein; scales of veins small, subtruncate, brown with violet luster. Halteres with pale stems and black knobs.

Legs rather long, dark metallic blue scaled with a violet reflection, darker distally; femora broadly silvery white scaled beneath nearly to apices. Claw formula, 0.0–0.0–0.0.

Length: Body about 8 mm.; wing 5.5 mm.

Male.—We have seen no specimen of this sex. It differs in the usual sexual characters and the coloration appears to be much like that of the female. The caudal tuft is said to be golden yellow and black, the yellow hair-scales occupying the sides of the sixth segment and the apical margin of the eighth.

Larva, Stage IV.—Head subquadrate, about as long as wide, the posterior angles rounded, insertion of antennæ rather prominent; front margin deeply emarginate at middle, produced on each side of it into a large prominent lobe. Mouth-brushes inserted beneath apices of frontal lobes, each consisting of ten stout curved lamelliform blades with hooked tips. Antennæ very slender and rather long, subcylindrical, slightly thickened at base. Skin of body during life showing iridescent colors and spotted with red and green; chitinized parts yellow. Air-tube rather slender, slightly tapered, over four times as long as basal width; a single pair of tufts at basal sixth. Anal segment about as long

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as wide, ringed by the plate, the latter with a series of long and rather sparse spines on apical margin; dorsal tufts of five long hairs; ventral brush well developed, confined to the barred area; anal gills very short.

The larva occurs in water held by the leaf-bases of epiphytic bromeliads.

Forested regions of South America; Trinidad.

Trinidad, West Indies (F. W. Urich). Reported also from Bahia, Brazil (Wiedemann, Bourroul).

Megarhinus violaceus has been wrongly identified by modern authors, the *M. purpureus* of Theobald having been mistaken for this species. The error appears to have originated with Theobald. Dr. Adolf Lutz has informed us that *Megarhinus iris* Knab is a synonym of *violaceus*, and we accept this opinion. Knab considered as specific the difference in the coloration of the caudal tuft, that of *violaceus* being described as golden yellow and black, while that of his specimen was creamy yellow and black; also the presence of the large whitish lateral spots of the abdomen, not mentioned in connection with Wiedemann's species. It now seems probable that these differences are sexual rather than specific.

MEGARHINUS GRANDIOSA Williston.

Megarrhina grandiosa Williston, Biol. Centr. Amer., Dipt., i, 224, 1900.
Megarhinus grandiosa Howard, Mosquitoes, 240, 1901.
Megarhinus (? Toxorhynchites) grandiosus Theobald, Mon. Culic., iii, 113, 1903.
Megarhinus grandiosus Blanchard, Les Moust., 625, 1905.
Megarhinus grandiosa Dyar & Knab, Smiths. Misc. Colls., quart. iss., xlviii, 248, 258, 1906.
Megarhinus grandiosus Theobald, Mon. Culic., v, 94, 1910.

ORIGINAL DESCRIPTION OF MEGARRHINA GRANDIOSA:

♀. Antennæ brown. Proboscis black. Palpi black, covered with black and violet tomentum. Face somewhat reddish. Occiput black above, and covered with green and yellow tomentum. Thorax deep red, the ground-colour of the mesonotum mostly concealed beneath a metallic-green tomentum, that of the pleurae more silvery or yellowish-white. Abdomen brown or yellowish-brown, the dorsum concealed beneath green tomentum, like that of the mesonotum. Legs yellow; dorsal surface of the femora blackish, with green and violet tomentum; base and extreme tip of the hind tibiae brown, the remaining portion with yellow hair; dorsal surface of the front tibiae blackish, with violet tomentum; front metatarsi, except the tip, blackish, the remainder of the front tarsi light yellow; hind tarsi blackish, the tip of the third joint, and the fourth and fifth wholly, nearly white; inner side of the hind metatarsi yellow. Wings tinged with yellowish, the scales dark brown. Length 10 millim., inclusive of proboscis 18–20 millim.

Hab. Mexico, Omilteme in Guerrero, 8000 feet (*H. H. Smith*).

One specimen. Distinguishable from *M. rutila*, Coq., by the colour of the legs.

There are no specimens of this species in the collection of the U. S. National Museum.

The male and larva are unknown; the life history and habits are also unknown.

Reported from Mexico (Williston).

MEGARHINUS LONGIPES Theobald.

Megarhinus longipes Theobald, Mon. Culic., i, 241, 1901.
Megarhina longipes Giles, Handb. Gnats or Mosq., 2 ed., 277, 1902.
Megarhinus longipes Blanchard, Les Moust., 226, 1905.
Megarhinus longipes Dyar & Knab, Smiths. Misc. Colls., quart. iss., xlviii, 248, 1906.
Megarhinus longipes Theobald, Mon. Culic., iv, 128, 1907.
Megarhinus longipes Theobald, Mon. Culic., v, 92, 1910.

ORIGINAL DESCRIPTION OF MEGARHINUS LONGIPES:

Thorax brown, with small bronzy and green scales, the green ones lateral. Abdomen covered with metallic olive-green scales; venter golden; first segment pale blue; apex yellow, with yellow hairs. Legs long and rather thick, iridescent, dull yellowish and brownish-black.

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♀. Head clothed with flat, golden-brown scales behind, pale green ones in front; antennae brown, basal joints small and rotund, with greyish sheen; palpi with metallic green scales; proboscis coppery.

Thorax brown, with small bronzy and green scales, the green ones at the sides; prothoracic lobes with pale blue scales; scutellum clothed with pale brown scales, with golden and other reflections, those on the lateral lobe pale blue; pleurae brown, with dense masses of pale golden scales; metathorax dark brown.

Abdomen covered with bright, metallic, olive-green scales, the venter golden scaled; first segment with pale blue scales, and the apex yellow, with dense yellow hairs.

Legs long and moderately thick, in the fore legs the bases of the femora are yellowish; the remainder of them, the tibiae and metatarsi deep steely blue; the first three tarsal joints yellowish-white, the last blackish, in the mid legs much the same; hind legs, with the femora, pale at the base, deep blue at the apex, with a pale knee spot; tibiae golden, except at the base, where they are dark brown; metatarsus golden-bronzy towards the tip, first and second tarsal joints deep purplish-black, the apex of the latter joint white, last two joints lost; fore and mid ungues nearly straight, equal and simple.

Wings slightly dusky along the costal border, some of the veins with metallic purple scales; supernumerary cross-vein some distance nearer the apex of the wing than the mid cross-vein, the latter joining and forming almost a right angle with the posterior cross-vein.

Halteres pale, with fuscous knob.

Length.—8 mm. (of mid legs 18 mm., of wings 9 mm.).

Habitat.—Mexico.

Observations.—Described from a single ♀ in the British Museum collection. It is a very distinct, rather iridescent, yellowish-looking, large species, with venation like a typical *Megarhinus*, but with no caudal tuft, with pale olive-green abdomen, except the first segment, which is pale blue. It shows considerable variation in colour when held in different directions, but its large size and general yellowish hue and absence of caudal tufts should at once separate it, as well as its long spider-like legs.

This species may belong to my genus *Toxorhynchites*, as I am not certain from a single specimen if the palpi are broken or not; they appear as if broken.

We have no specimen of *Megarhinus longipes* and no additional authentic specimens have been reported by others.

The male and larva are unknown and nothing is known of the life history.

Mexico (Theobald).

Our whole knowledge of this species rests upon Theobald's description of a single female in the British Museum. The exact locality in Mexico is not given. The species seems distinct, as shown in Theobald's figure (Mon. Culic., pl. ix, fig. 34) with its green body and yellow legs; it should be kept in mind, however, that the specimen may be an old one and the pale appearance due to fading or partial denudation. In his original description Theobald described white markings on all the tarsi, but later, in his table (Mon. Culic., iv, 128), he lists the species under the heading "Tarsals unbanded" without any explanation of this startling contradiction.

MEGARHINUS RUTILA Coquillett.

Megarhinus rutila Coquillett (in part), Can. Ent., xxviii, 44, 1896.
Megarhinus rutila Coquillett (in part), U. S. Dept. Agr., Div. Ent., Circular 40, 2d ser., 7, 1900.
Megarhinus rutilus Howard (in part), U. S. Dept. Agr., Div. Ent., Bull. 25, n. s., 22, 1900.
Megarhina rutilla Giles, Handb. Gnats or Mosq., 131, 1900.
Megarhinus rutillus Theobald (in part), Mon. Culic., i, 244, 1901.
Toxorhynchites rutilus Howard, Mosquitoes, 155, 240, 1901.
Megarhina rutilla Giles (in part), Handb. Gnats or Mosq., 2 ed., 268, 275, 1902.
Toxorhynchites rutilus Theobald, Mon. Culic., iii, 124, 1903.
Toxorhynchites rutilus Aldrich, Cat. N. Amer. Dipt., 124, 1905.
Megarhinus rutilus Blanchard (in part), Les Moust., 228, 1905.
Megarhinus rutilus Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 14, 1906.

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Megarhinus rutila Dyar & Knab, Smiths. Misc. Colls., quart. iss., xlviii, 248, 1906.
Megarhinus rutilus Vosseler, Deutsche Ent. Zeitschr., 1907, 245, 1907.
Megarhinus rutilius Theobald (in part), Mon. Culic., v, 94, 1910.

ORIGINAL DESCRIPTION OF MEGARHINUS RUTILA:

♂. Head black, tomentum of occiput blue in the centre, white next the eyes; antennae brown, the first joint covered with blue tomentum on the outer side, that on the inner side silvery-white; hairs of antennae dark gray, their bases brown; proboscis and palpi black, covered with an appressed blue, golden and violet tomentum. Thorax brown, its tomentum golden-brown and violet, that on the lateral margins pale golden; humeral angle and two large spots on the pleura covered with golden tomentum, scutellum covered with blue, black and violet tomentum. Abdomen black, its tomentum blue, becoming violet at the tip, that on the lateral margins golden, on the venter blue, mixed with a few golden ones; sides of abdomen bearing a few short pale yellow hairs. Legs black, the tomentum mixed blue, violet and golden, that on the coxae and apices of femora entirely golden; second joint and base of the third of each front and middle tarsi, fourth joint and base of the fifth of the hind tarsi, white; one claw of each front and middle tarsi toothed, the other claws simple. Wings hyaline, costal margin and the veins brown, the scales blue and violet.

♀ Same as the ♂, with these exceptions: First joint of antennae destitute of blue and silvery tomentum; second, third and base of fourth joint of the front and middle tarsi white; tarsal claws simple. Length, 7 to 10 mm.

North Carolina and Georgiana, Florida. Three males and five females in the National Museum.

Readily recognized by the colouring of the tarsi.

DESCRIPTION OF FEMALE AND MALE OF MEGARHINUS RUTILA (LARVA UNKNOWN):

Female.—Proboscis rather long, curved, tapering gradually to tip, covered with metallic blue and dark bronzy scales. Palpi long and stout, about two-thirds the length of the proboscis; long joint with a constriction at basal two-fifths, the succeeding joint about one-third the length of long joint, terminal joint minute; vestiture brilliant blue, tip, constriction, and apex of long joint pale lilac; many pale brassy scales beneath and at sides. Antennæ filiform, delicate, the joints subequal, rugose, finely and densely pilose, blackish; second joint longer and slightly stouter than the succeeding one, its basal half with a dorsal crest of erect brilliant blue scales; hairs of whorls sparse, moderate, black; tori black with silvery pruinosity. Clypeus broad, transverse, not prominent, angles bluntly rounded, black with silvery pruinosity. Occiput covered with appressed metallic green and blue scales, ocular margins silvery-white; cheeks and head beneath silvery-white scaled.

Prothoracic lobes large and prominent, clothed with broad, appressed light metallic blue scales and bearing coarse black setæ. Mesonotum clothed with bronzy-brown scales on the disk, well defined lateral marginal stripes and a narrow median stripe of very pale metallic blue scales; patches of brilliant blue scales at roots of wings. Scutellum covered with silvery-blue scales. Postnotum brown, nude. Pleuræ and coxæ brown, densely covered with silvery-white scales.

Abdomen subcylindrical, depressed, broadest at middle; dorsal vestiture of dark greenish-blue metallic scales, shading off into blue posteriorly; lateral margins of all the segments silvery, expanded medianly on last three segments; first segment metallic green scaled in the middle, bright blue at the sides; a lateral fringe of short cilia; venter clothed with silvery scales with a yellowish tinge, a broad median, longitudinal metallic blue stripe extends to apex of seventh segment.

Wings narrow, hyaline with a yellowish tinge, particularly towards costa; basal cross-vein oblique and almost or quite incident with anterior cross-vein; costal vein metallic blue scaled. Halteres with silvery and blue scales on knobs.

Legs slender; vestiture dark blue, the tarsi white marked; femora brassy

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scaled beneath; knees silver scaled; front and middle tibiæ brassy marked along outer surface; front tarsi with apex of first joint and all of second, third, and fourth joints brilliant white; middle pair marked like the anterior pair; posterior tarsi with apex of third, all of fourth, and all but extreme tip of fifth joint brilliant white. Claw formula, 0.0–0.0–0.0.

Length: Body 10 mm.; wing 8 mm.

Male.—Proboscis curved, tapering gradually to a point. Palpi longer than the proboscis; long joint about two-fifths the entire length of palpi, with a joint-like constriction below its middle; penultimate joint about one-half the length of preceding and equally stout; terminal joint about as long as long joint, slender, slightly curved and tapering to a point; vestiture steel-blue and purple, beneath with brassy scales on all but last joint, the false articulation of the long joint and apices of all but the last pale lilac scaled. Antennæ stout, densely plumose; last two joints long, slender and densely ciliate, the others short and stout, smooth, with a dense whorl of long blackish hairs; second joint long and very stout, compressed, about two and one-half times the length of the following one, with a crest of semi-erect steel-blue and silver scales, the entire segment hairy without distinct whorl; tori black with silver-gray pruinosity. Clypeus transverse, broadly rounded at sides, black with silvery-gray pruinosity. Occiput covered with metallic blue and green scales, ocular margins silvery-white scaled; cheeks and head beneath clothed with silvery-white scales.

Prothoracic lobes large and prominent, covered with broad, flat metallic-blue scales and bearing stout black setæ. Mesonotum dark brown; vestiture of dark bronzy-brown scales with iridescent luster, with broad lateral marginal stripes and a narrow median stripe of pale silvery-blue scales; patches of brilliant blue scales at roots of wings. Scutellum covered with brilliant blue scales in the middle, at the sides with silvery-blue ones. Postnotum piceous, nude. Pleuræ and coxæ dark brown, densely covered with silver-white scales.

Abdomen subcylindrical, depressed; dorsal vestiture steel-blue, the eighth segment with purple scales; first segment brilliant blue scaled; lateral margins of segments two to six narrowly silver marked, seventh segment with posterior angles broadly silvered, eighth segment finely margined with silver posteriorly; claspers purple scaled; venter metallic-blue scaled, all but the last segment with the lateral margins narrowly silvery; lateral cilia short, dense, pale yellowish.

Wings very narrow, with a smoky tinge, particularly in the costal region; basal cross-vein oblique, almost, or quite, incident with the anterior cross-vein. Knobs of halteres silver scaled.

Legs slender; vestiture dark blue; femora silver marked beneath; knees white; front and middle tarsi with second segment and basal two-thirds of third silvery-white; hind tarsi with fourth and basal two-thirds of fifth segments silver-white. Claw formula, 1.0–1.0–0.0.

Length: Body 10 mm.; wing 8.5 mm.

Genitalia (plate 36, fig. 243): Side-pieces conically tapered, over twice as long as wide, a short, broad basal lobe bearing a row of coarse setæ; clasp-filament long and slender, with a long spine close to tip and a few fine setæ on inner side. Harpes broad, their edges recurved, tip bent over, with a few minute terminal setæ. Harpagones wanting. Unci slender, fusiform, pointed, a rounded basal lobe bearing a row of hairs directed outwardly.

Life history and habits unknown.

Florida and Georgia.

Georgiana, Florida (W. Wittfeld); Cornelia, Georgia, June 8, 1909 (W. V. Reed).

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But one specimen of *Megarhinus rutila* has come to hand since the original description. The specimen originally mentioned from North Carolina has disappeared from the collection, but we have little doubt that it was wrongly associated, and that it was in reality a specimen of *Megarhinus septentrionalis*. It must be pointed out that the female of *M. septentrionalis* was until recently identified as *M. rutila*, so that many of the records under the name *rutila* or *rutilus* in reality apply to *septentrionalis*.

MEGARHINUS TRINIDADENSIS Dyar & Knab.

Megarhinus trinidadensis Dyar & Knab, Smiths. Misc. Colls., quart. iss., xlviii, 247, 248, 252, 1906.
Megarhinus trinidadensis Theobald, Mon. Culic., v, 602, 1910.

ORIGINAL DESCRIPTION OF MEGARHINUS TRINIDADENSIS:

Male.—Head behind the eyes light blue with pearly lustre, at the sides and beneath silvery. Antennae densely plumose, the second segment long and stout (stouter than in *moctezuma* and longer than in *septentrionalis*), its crest densely clothed with nearly flat purple scales. Palpi blue and purple, segments 2, 3 and 4 in certain lights largely silvery and iridescent and pale at the apices. Second segment slightly shorter than fourth, third longer; fifth as long as third and fourth together. Prothoracic lobes bright metallic blue. Mesothorax clothed with light green scales on the disc, light blue along the sides. Scutellum, ridge of scales over the root of wing and first abdominal segment brilliant greenish blue. Pleurae and coxae silvery.

Abdomen deep blue, purple on segments 6, 7 and 8. Beneath golden, a narrow black median line on segments 3–7, eighth segment violet. Lateral hairs pale, dark on eighth segment and genitalia.

Legs dark with blue and purple lustre; femora golden beneath; front tibiae golden on the outside. Second segment of middle tarsi bluish-silvery on the outer side. In the hind tarsi the fourth and most of the fifth segments silver-scaled.

Female.—Antennal segments more elongate than in the preceding species. Second segment hardly stouter than the succeeding ones, slightly thickened basally, more than twice as long as the third, the basal ⅔ with a crest of dark erect scales. Palpi blue and purple with many golden scales, particularly at the sides and beneath; apices of the segments pale violet. Second and third segments laterally compressed, third enlarged at the apex, fourth nearly cylindrical and slightly shorter than second; third segment longest, not twice the length of second.

Abdomen greenish towards base, then steel blue, the eighth segment violet. Pale lateral spots, most conspicuous on segments 5, 6 and 7. Sixth and seventh segments finely margined behind with gold, eighth segment marked with gold. Abdomen golden at the sides and beneath, a narrow blue median line on segments 2–7.

Legs dark; the femora golden beneath; the middle and hind tibiae dull golden upon the inside, the front tibiae on the outside and passing over onto the first tarsal segment. Front and middle legs with the second and most of the third tarsal segments white; hind legs with the fourth and all but the tip of the fifth tarsal segment white.

Length 6–10 mm.
Type No. 9954, U. S. N. M.
Locality: Trinidad (A. Busck, F. W. Urich).
3 ♀, 2 ♂. In the second male the markings of the middle tarsi are obsolete.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF MEGARHINUS TRINIDADENSIS:

Female.—Proboscis rather long, slender, curved, tapering to a point. Palpi long and stout, about two-thirds the lengths of the proboscis; antepenultimate segment elongate, stout, somewhat compressed, clavate, a constriction at basal two-fifths; penultimate segment stout, cylindrical, about one-third the length of preceding one; terminal segment minute; vestiture metallic-blue and purple with scattered brassy scales, the apices of the segments light blue, beneath and at sides yellowish-silvery scaled. Antennæ filiform, slender, the joints subequal, blackish, rugose, densely ciliate, with basal whorls of sparse hairs; second joint long and stouter, about twice as long as the succeeding one, its basal half with a crest of erect metallic scales; tori brown with silvery pruinosity. Clyp-

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eus transverse, broadly rounded, brown with silvery pruinosity. Occiput covered with flat, light green and blue iridescent scales, ocular margins silvery; cheeks and head beneath silver scaled.

Prothoracic lobes large and prominent, covered with broad, flat silvery-blue scales and bearing a few coarse black setæ. Mesonotum clothed with small very dark brown scales on the disk, the lateral margins broadly silvery-blue scaled, on anterior two-thirds of disk an illy defined metallic blue median stripe and metallic green subdorsal stripes which posteriorly become confluent, the green scales predominating posteriorly; patches of brilliant blue scales over roots of wings. Scutellum covered with greenish-silver scales. Postnotum brown, slightly pruinose, nude. Pleuræ and coxæ brown, densely covered with silvery scales.

Abdomen subcylindrical, somewhat depressed, broadest at middle, with indications of a dorsal ridge; dorsal vestiture basally olivaceous-green, shading into a deep blue on fifth, sixth, and seventh segments, eighth segment violet; second to seventh segments with large golden lateral blotches, seventh and eighth segments finely margined with gold posteriorly; ventral vestiture burnished golden, with a very narrow steel-blue median longitudinal stripe.

Wing narrow, with a smoky tinge, particularly in costal region; third vein nearly incident with fourth vein at anterior cross-vein, basal cross-vein oblique, joining fourth vein close to anterior cross-vein; costal vein metallic-purple scaled. Knobs of halteres silver scaled on apex.

Legs slender; vestiture steel-blue; femora brassy beneath; front tibiæ and base of first tarsal segment brassy on outer side; middle tibiæ brassy on inner side and with a sprinkling of brassy scales on outer side, base of middle tarsus brassy scaled; hind tibiæ sprinkled with brassy scales on outer side; front tarsi with second segment entirely white and base of third segment silvery above; middle tarsi with second and third segments entirely white; hind tarsi with fourth and all but the tip of fifth segment white. Claw formula, 0.0–0.0–0.0.

Length: Body 7–8 mm.; wing 7 mm.

Male.—Proboscis long and curved, slender, tapering to a point. Palpi very long, longer than the proboscis; long joint stout, about two-fifths the length of the entire palpi, below its middle a constriction giving the appearance of segmentation; penultimate joint about two-thirds the length of preceding one and nearly as stout; terminal joint long and slender, slightly curved and tapering to a point, about as long as long joint; vestiture metallic violet and purple with a sprinkling of brassy scales, apices of all but last joint and constriction of long one pale violet scaled; beneath all but last joint mostly brassy scaled. Antennæ stout, densely plumose; last two joints long and slender, densely ciliate, the others short, stout, with basal whorl of long, dense brown hairs; second joint long and stout, more than twice the length of the succeeding one, compressed, without hair-whorl and with a broad dorsal crest of erect brilliant purple and silvery scales; tori black with silvery pruinosity. Clypeus transverse, broadly rounded, deep brown with silvery pruinosity. Vestiture of mesonotum predominatingly dark metallic blue, lateral margins broadly pale blue, a broad median stripe, a patch over root of wings and posterior region brilliant metallic-blue scaled; subdorsal stripes of coppery scales. Scutellum covered with brilliant light blue scales which, at the side, become silvery-blue. Abdomen deep blue at base, shading into reddish-purple on sixth, seventh, and eighth segments; claspers purple scaled; venter bright golden scaled, with a very narrow median longitudinal stripe of steel-blue, the eighth segment metallic purplish-red; lateral ciliation short and delicate, pale yellow. Wings narrow, smoky, particularly along costa; basal cross-vein oblique, contiguous,

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or nearly so, with anterior cross-vein. Legs slender; vestiture dark metallic-purple and violet; femora brassy beneath; front tibiæ brassy on outer side; middle tibiæ bronzy on inner side; hind tibiæ with scattered brassy scales on outer side; middle tarsi with second segment silvery-white on outer side; hind tarsi with fourth segment entirely clear white, fifth silvery-white along basal two-thirds on outer side. Claw formula, 1.0–1.0–0.0.

Length: 9 to 11 mm.

Genitalia (plate 36, fig. 242): Side-pieces over twice as long as wide, strongly tapered to a narrow rounded tip; a conical basal lobe clothed with coarse setæ. Clasp-filament long and slender, about as long as side-piece, with a long articulated terminal spine and a row of sparsely set setæ within. Harpes long, prominent, narrow, concave with revolute margins, tip bent outward and pointed. Unci conical at base, tips produced as a pair of long, slender points, dentose within. Basal appendages forming a rounded quadrate prominence with a group of setæ at each angle.

Larva, Stage IV (plate 127, fig. 441).—Head subquadrate, longer than wide, sides nearly straight, insertion of antennæ rather prominent; front margin deeply emarginate at middle, produced on each side of it into a large prominent lobe. Antennæ cylindrical, slender, rather long, smooth; two separate hairs at outer third followed by a short multiple tuft; three small terminal digits and and a long seta. Two pairs of single hairs behind frontal lobes, a group of three in the sinus behind the antennæ, some small tufts beyond middle of sides. Mouth-brushes inserted on frontal lobes, folded downward and backward. Mental plate broadly triangular, an apical tooth in a shallow sinus; nine stout subequal teeth on each side, a second plate before, membranous, with stout apical tooth and a row of many long fringed filaments on each side. Mandible quadrangular, straight without, smooth; two branched appendages at angle before tip; an outer row of coarse cilia; terminal dentition of five teeth, very large, ensiform, the third and fifth smaller; a large rounded projection basad of the teeth, within which arises a row of long subequal setæ. Maxilla rounded quadrangular, the basal angle with a group of flattened appendages with recurved tips; inner angle with shorter filaments, a seta and two papillæ; palpus nearly divided by a suture, erect, columnar, flat at tip, smooth, with three rudimentary terminal digits. Thorax rounded, about as wide as long; lateral hairs short, very stout, the heaviest ones spinulose. Abdomen stout, segments angled at the sides, anterior ones shorter; hairs abundant but not long, all the lateral tufts multiple to fifth segment, double on sixth. Tracheal tubes invisible; skin darkly and blotchily pigmented. Air-tube short and stout, slightly more than twice as long as wide, conically tapered outwardly; no pecten; a single tuft near base. A large plate on sides of eighth segment, with two very stout ciliate hairs on its posterior margin. Anal segment about as long as wide, ringed by the plate; dorsal tufts of two long brushes on each side; a single spinulose lateral hair; ventral brush well developed, the tufts amply feathered; anal gills very short, bud-shaped.

The larvæ live in the water in holes in trees inhabited by other mosquito larvæ, upon which they prey. Mr. Urich and Mr. Busck both took them in such locations.

Island of Trinidad.

San Juan (F. W. Urich); Sangre Grande (F. W. Urich); St. Joseph, June 15, 1905 (A. Busck); Montserrat, June 27, 1905 (A. Busck).

The specimens mentioned by Mr. Busck under this name (Smiths. Misc. Colls., quart. iss., lii, 60, 1908) really belong to *Megarhinus hypoptes*.

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MEGARHINUS SEPTENTRIONALIS Dyar & Knab.

Megarhina ferox Walker (not Humboldt, not Wiedemann), List Dipt. Brit. Mus., i, 1, 1848.
Megarhinus rutila Coquillett (in part), Can. Ent., xxviii, 44, 1896.
Megarhinus ferox Howard (not Humboldt, not Wiedemann), U. S. Dept. Agr., Div. Ent., Bull. 4, n. s., 24, 1896.
Megarhina rutilla Giles (in part), Handb. Gnats or Mosq., 131, 1900.
Megarhina ferox Giles (in part, not Humboldt, not Wiedemann), Handb. Gnats or Mosq., 135, 1900.
Megarhinus rutila Coquillett (in part), U. S. Dept. Agr., Div. Ent., Circular 40, 2 ser., 7, 1900.
Megarhinus rutilus Howard (in part), U. S. Dept. Agr., Div. Ent., Bull. 25, n. s., 22, 1900.
Megarhinus rutillus Theobald (in part), Mon. Culic., i, 244, 1901.
Megarhinus portoricensis Theobald (in part, not von Röder), Mon. Culic., 1, 232, 1901.
Megarhinus portoricensis Howard (not von Röder), Mosquitoes, 240, 1901.
Megarhina rutilla Giles (in part), Handb. Gnats or Mosq., 2 ed., 275, 1902.
Megarhina portoricensis Giles (in part, not von Röder), Gnats or Mosq., 2 ed., 275, 1902.
Megarhinus rutilus Dyar (in part, not Coquillett) + *Megarhinus portoricensis* Dyar (in part, not von Röder), Proc. Ent. Soc. Wash., vi, 20, 1904.
Megarhinus rutilus Blanchard (in part), Les Moust., 228, 1905.
Megarhinus ferox Blanchard (in part, not Humboldt, not Wiedemann), Les Moust., 225, 1905.
Megarhinus portoricensis Blanchard (in part, not von Röder), Les Moust., 224, 1905.
Megarhinus portoricensis Dyar (not von Röder), Journ. N. Y. Ent. Soc., xiii, 108, 1905.
Megarhinus portoricensis Theobald (in part, not von Röder); Gen. Ins., Dipt., 26[bis] fasc., 13, 1905.
Megarhinus portoricensis Herrick (not von Röder), Ent. News, xvi, 281, 1905.
Megarhinus portoricensis Felt (not von Röder), Bull. 97, N. Y. State Mus., 494, 1905.
Megarhinus sp., Hopkins, Proc. Ent. Soc. Wash., vii, 4, 1905.
Megarhinus sp. not *portoricensis*, Ludlow, Can. Ent., xxxviii, 134, 1906.
Megarhinus portoricensis (in part, not von Röder) + *Megarhinus rutilus* (in part, not Coquillett) Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 14, 1906.
Megarhinus portoricensis Dyar & Knab (in part, not von Röder), Journ. N. Y. Ent. Soc., xiv, 178, 1906.
Megarhinus portoricensis Dyar (not von Röder), U. S. Dept. Agr., Bur. Ent., Circular 72, 1, 1906.
Megarhinus septentrionalis Dyar & Knab, Smiths. Misc. Colls., quart. iss., xlviii, 247, 248, 249, 1906.
Megarhinus herrickii Theobald, The Entom., xxxix, 241, 1906.
Megarhinus septentrionalis Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 12, 1907.
Megarhinus herrickii Theobald, Mon. Culic., iv, 131, 1907.
Megarhinus septentrionalis Morgan & Cotton, Science, n. s., xxvii, 28, 1908.
Megarhinus septentrionalis Thibault, Proc. Ent. Soc. Wash., xii, 22, 1910.
Megarhinus portoricensis Theobald (in part, not von Röder), Mon. Culic., v, 93, 1910.
Megarhinus herrickii Theobald, Mon. Culic., v, 94, 1910.
Megarhinus rutillus Theobald (in part), Mon. Culic., v, 94, 1910.
Megarhinus septentrionalis Theobald, Mon. Culic., v, 603, 1910.

ORIGINAL DESCRIPTION OF MEGARHINUS SEPTENTRIONALIS:

Male.—Head behind the eyes metallic blue, at the sides and beneath yellowish silvery. Antennae densely plumose; second segment stout, laterally compressed, nearly as long as the next three and clothed on the upper part with golden and purple scales. Palpi dark violet; the second, third and fourth segments with many golden and iridescent scales, their apices pale violet; terminal segment nearly black. Second and fourth segments of about equal length, the third longer, the fifth about twice as long as the fourth. Prothoracic lobes light metallic blue. Mesothorax deep purple on the disc, the sides and a median stripe yellow, clearly defined. A patch of blue scales over the roots of the wings. Scutellum edged with silvery yellow scales broadened to patches at the sides. Pleurae and coxae clothed with pale golden scales. Abdomen above dark metallic blue, the basal segment clothed with coarser lighter-colored greenish scales. Patches of golden scales at the sides of the

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sixth and seventh segments. Beneath pale golden, a broad median purple stripe on segments 3–7; eighth segment purple beneath, golden at the sides. Lateral cilia pale yellow except on the eighth segment and claspers, where they are dark.

Legs dark with purple lustre. The femora pale golden on the lower surface. Front tibiae dull golden on the outside, the middle tibiae on the inside. Middle legs with the third and part of the fourth segments of the tarsi silvery on the outer side. Hind legs with the fourth tarsal segment white.

Female.—Antennæ: second segment twice as long as the third and but slightly thicker, the basal half with a crest of erect scales. Palpi about two-thirds the length of the proboscis, four-jointed, stout, more or less laterally compressed, the third segment much thickened at the apex. Color violet-blue and purple with many pale golden scales, particularly on the sides of the second and third segments; apices of the segments pale mauve. Third segment much the longest, fourth shorter and stouter than the second, nearly cylindrical.

The abdomen is more or less greenish, passing into steel blue towards the tip. Segments 4–7 show golden spots at the sides and the sixth and seventh are finely margined behind with gold; eighth segment purplish spotted with gold. Femora and tibiae as in the male. All the tarsi marked with white. On the first and second pair of legs the tarsi have the tip of the first, the second and the third, and part of the fourth segments white. On the hind legs the fourth and all but the tip of the fifth tarsal segments are white.

Length, 6–10 mm.

Type No. 9952, U. S. N. M.

Localities: Woodstock, Va. (F. C. Pratt), Morgantown, W. Va. (A. D. Hopkins), Washington, D. C. (J. Kotinsky), Plummer's Island, Md. (A. K. Fisher, W. V. Warner), River Township, Henderson Co., N. C. (J. L. Coker, Jr.), St. Louis, Mo. (A. Busck), Baton Rouge, La. (J. W. Dupree), Benoit, Miss. (H. S. Barber), Ringo, Indian Territory (A. N. Caudell), Skyland, Va. (Miss W. Pollock), Grandfather Mt., N. C. (F. Sherman).

13 ♂, 11 ♀. It should be noted that the markings on all the tarsi are clear white in the female. In the male the silvery markings of the middle tarsi are less distinct than the white on the hind tarsi and sometimes have to be carefully looked for. These markings are uniform for either sex in all the specimens examined. We have seen no specimens of *Megarhinus* from North America with the front and middle tarsi entirely dark.

ORIGINAL DESCRIPTION OF MEGARHINUS HERRICKII:

Megarhinus portoricensis. Herrick (non Von Roder) (Entom. News (1905), p. 281).

Allied to *M. portoricensis.* Von Roder, but differs in the following respects:—

(i) The last segment of the male palpus much longer than the penultimate, at least twice as long; and (ii) the head iridescent bluish green instead of brown with a shiny white border around the eyes, white scales laterally, and azure blue spots in front; (iii) the hind tarsi are white except a black ring at the distal ends, whilst in *portoricensis* the penultimate tarsal segment only is white save for a small basal dark spot.

Habitat.—Mississippi State, U. S. A.

Observations.—This species is referred to by Professor Glenn Herrick as *portoricensis*, but he points out very obvious and marked differences. This new species has been named after him.

The specimens, he says, were bred from larvæ taken "in the cup-like bottom of a massive iron post supporting one corner of a large water tank. . . . Here we found five large, dark brown, very spiny larvæ, and also remnants of cast pupal skins, conspicuous for their long spines, made especially prominent by the colonies of Vorticellæ clinging to them. . . . We fed the larvæ entirely on *Culex* larvæ and great numbers of the latter were devoured. For example, three *Megarhinus* larvæ in four days ate eighty-three large *Culex* larvæ, besides many small ones just hatched from eggs.

"The larvæ transformed to pupæ on September 28th.

"The pupal stage lasted four days, while that of a third extended over a period of five days. The anal flaps seem to have a characteristic shape, and the edges, for the most part, are beset with short stiff spines."

DESCRIPTION OF FEMALE, MALE, AND LARVA OF MEGARHINUS SEPTENTRIONALIS:

Female.—Proboscis rather long, curved, tapering to a point. Palpi about two-thirds the length of the proboscis; long joint stout, somewhat compressed, with a constriction at basal two-fifths; penultimate joint stout, cylindrical,

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about two-fifths the length of long joint; terminal joint minute; vestiture metallic dark violet and blue, profusely sprinkled with golden scales, particularly at the sides; apices of segments pale lilac. Antennæ filiform, slender, the joints subequal, with basal whorls of sparse hairs; second joint elongate, about twice as long as the succeeding one, stouter, a crest of erect dark scales along basal two-thirds; tori black with silvery pruinosity. Clypeus transverse, broadly rounded, black with silvery pruinosity. Occiput covered with flat, brilliant blue scales, ocular margins silvery; cheeks and head beneath silvery scaled.

Prothoracic lobes prominent, covered with broad, flat, brilliant blue scales and bearing a few coarse black setæ. Mesonotum clothed with small very deep purplish-brown scales on the disk, a median stripe and broad stripes on lateral margins involving anterior angles, well defined, of light greenish-yellow scales with iridescent luster; a sprinkling of dark blue scales among the purplish ones, particularly on the posterior region; over the roots of the wings are patches of brilliant blue scales. Scutellum brilliantly blue scaled at the middle, sides silvery-blue and yellowish scaled in continuation of mesonotal lateral stripes. Postnotum dark brown, nude. Pleuræ and coxæ dark brown, mostly covered with silver scales with a slight yellowish tinge.

Abdomen depressed; dorsal vestiture dark metallic-blue with a greenish tinge at base and purplish at tip, eighth segment bright violet; first segment brilliant blue scaled, with silver patches at the sides; lateral margins of segments yellowish-silvery, broadest near base and forming conspicuous median indentations on fourth, fifth, sixth, and seventh segments; sixth, seventh, and eighth segments marked with yellowish-silver along posterior margin; venter yellowish-silver scaled, with a broad median, longitudinal, deep metallic blue stripe, becoming narrow posteriorly and terminating near hind margin of seventh segment; eighth segment with numerous yellow apical setæ; no caudal tufts.

Wings rather narrow, smoky along the costal area; basal cross-vein oblique, joining the fourth vein beyond the anterior cross-vein; costal vein blue and purple scaled. Halteres with pale stems and black silver scaled knobs.

Legs slender; vestiture deep violet and blue marked with white; femora pale at base, bright brassy beneath and at sides, apex dark ringed; knees white; front tibiæ brassy on outer side; middle tibiæ brassy on inner side; hind tibiæ with golden scales on outer side; front and middle tarsi with second and third and all but apex of fourth segments brilliant white; hind tarsi with extreme apex of third, all of fourth, and all but the tip of fifth segments brilliant white. Claw formula, 0.0–0.0–0.0.

Length: Body 7 to 10 mm.; wing 6 to 7.5 mm.

Male.—Proboscis rather long, curved, tapering to a point. Palpi rather stout, long, exceeding the proboscis; long joint about two-fifths the entire length of palpus, with a false articulation before middle and the apex somewhat dilated; penultimate joint more than half the length of long joint and equally stout; terminal joint slender, slightly curved and tapering to a point, about equal in length with long joint; long joint and succeeding one predominatingly brassy scaled, bases and apices and region of false articulation of long joint broadly metallic-blue scaled, extreme apices and false joint pale lilac; terminal joint dark purplish with a few golden scales. Antennæ stout, densely plumose; second segment nearly three times as long as the succeeding one, stout, with a crest of erect brassy scales; tori black with silvery pruinosity. Clypeus transverse, broadly rounded at the sides, black with silvery pruinosity. Abdomen somewhat compressed on basal half, depressed beyond and slightly dilated to apex of sixth segment; dorsal vestiture metallic deep blue, eighth segment

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purple-scaled towards lateral margins; first segment silvery-blue scaled; segments with lateral patches of brassy scales which are broadest on sixth and seventh segments; claspers purple-scaled; venter bright golden scaled, with a rather broad steel-blue median stripe which is much narrowed on seventh segment; eighth segment purple scaled; lateral ciliation moderate, pale yellowish. Wings narrow, smoky along outer margin; basal cross-vein oblique, reaching fourth vein at, or beyond, anterior cross-vein. Legs very dark blue and purple; femora beneath brassy, knees white; front tibiæ with golden scales on outer side; middle tibiæ with golden scales on inner side; hind tibiæ with a few golden scales on outer side; middle tarsi with second and basal two-thirds of third segments silvery-white on outer side; hind tarsi with fourth segment entirely brilliant white and base of fifth silvery white. Claw formula, 1.0–1.0–0.0.

Length: Body 7 to 11 mm.; wing 6 to 10 mm.

Genitalia (plate 37, fig. 245): Side-pieces over twice as long as wide, sharply conically tapered; a low lobe at base bearing three stout setæ. Clasp-filament slender, moderate, slightly thickened at base, bearing a long spine before tip, and a few minute setæ below. Harpes large, broad, with revolute margins, tips bent outward, pointed and bearing a few minute setæ. Harpagones wanting. Unci contiguous at their tips, forming a long cone, the margins revolute are serrate.

Larva, Stage IV (see the figure of the entire larva, plate 82).—Head subquadrate, longer than wide, sides nearly straight, insertion of antennæ rather prominent; front margin deeply emarginate at middle, produced on each side of it into a large prominent lobe. Antennæ cylindrical, slender, rather long, smooth; two separate hairs at outer third, followed by a short multiple tuft; three small terminal digits and a long seta. Two pairs of single hairs behind frontal lobes, a group of three in the sinus behind antennæ, some small tufts beyond middle of sides. Mouth-brushes inserted on frontal lobes, folded downward and backward, composed of ten stout, curved, lamelliform blades with slightly hooked cleft tips. Mental plate broadly triangular, emarginate at apex for the space of the three middle teeth, seven teeth on each side, stout, subequal; secondary plates thin, membranous, with apical fringes. Mandible quadrangular, straight without, smooth; two branched appendages at angle before tip; an outer row of coarse cilia; terminal dentition of five teeth, very large, ensiform, the third and fifth smaller; a large rounded projection basad of teeth, within which arises a row of long subequal setæ. Maxilla rounded quadrangular, basal angle with a group of flattened appendages with recurved tips; inner angle with shorter filaments, a seta, and two papillæ; palpus nearly divided by the suture, erect, columnar, flat at tip, smooth, with three rudimentary terminal digits. Thorax rounded, about as wide as long; lateral hairs short, very stout, heaviest ones spinulose. Abdomen stout, segments angled at sides, anterior ones shorter; hairs abundant but not long, all the lateral tufts coarse, multiple to fifth segment, arising from large chitinous tubercles. Tracheal tubes moderately broad, invisible in the larva, the skin darkly pigmented. Air-tube stout, conically tapered outwardly, about two and a half times as long as wide; no pecten; a single tuft near base. A large plate on sides of eighth segment with two stout spinulose hairs on its posterior margin. Anal segment about as long as wide, ringed by the plate; dorsal tufts of two long brushes on each side; a single spinulose lateral hair; ventral brush well developed, of branched tufts, posterior one feathered; anal gills very short, bud-shaped.

The larvæ live normally in water in hollow trees where other mosquito larvæ occur upon which they feed. More rarely they are found in artificial receptacles. Specimens have been taken in water-filled rock-holes by Messrs. Pergande and

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Clemons, in which cases they were associated with *Aëdes atropalpus*. The eggs are found floating on the water singly and the larvæ hatch quickly. They feed exclusively upon other mosquito larvæ present, which they swallow whole. They feed largely upon *Orthopodomyia signifer* and *Aëdes triseriatus* but will also eat other larvæ when opportunity offers, even of their own species. Hibernation occurs as fully grown larva and pupation follows in the spring, as shown by Morgan and Cotton. There are probably several generations during the season, as the imagos occur from early spring until late in the autumn. The larvæ can only overwinter in tree-holes containing permanently a supply of water. The adults are diurnal, both sexes frequenting flowers. Mr. Thibault has made the following observations which seem to stand in relation to the mating habits: "I find the males of a certain locality all go to some certain tree or bush and are always to be found there, yet not a single female will be seen. I have looked at all times of the day and before day and after night. I took all my males (a hundred or so) on some poison ivy that grew on a hackberry tree 100 yards from the breeding log. I could always find them here after they just made their appearance and nowhere else. The most of them were taken from the same bunch of leaves; but not a female did I ever see there."

Southeastern part of United States.

Washington, District of Columbia, September 9, 1901 (J. Kotinsky); Cabin John, Maryland, September, 1908 (F. Knab); Plummer's Island, Maryland, June 24, 1906 (A. K. Fisher), September 6, 1908 (E. A. Schwarz), April 18, 1913 (H. S. Barber), July 25 (W. V. Warner); Great Falls, Virginia, September 17, 1906 (T. Pergande); Woodstock, Virginia, June, 1903 (F. C. Pratt); Skyland, Virginia (Miss W. Pollock); Glen Carlyn, Virginia, July 14, 1907 (F. Knab); Fairfax County, Virginia, May 3, 1913 (G. S. Miller); Morgantown, West Virginia, June 10, 1898 (A. D. Hopkins); Hartsville, North Carolina (J. L. Coker); Grandfather Mountain, between Rock and Linville, North Carolina, August 28, 1906 (F. Sherman); Atlanta, Georgia (W. B. Summerall); Augusta, Georgia, September 10, 1909 (W. V. Reed); Knoxville, Tennessee, April 13, 1907 (Morgan & Cotton); St. Louis, Missouri, October 4, 1904 (A. Busck); Scott, Pulaski County, Arkansas, July 24, 1908, February 20, 1909 (J. K. Thibault, Jr.); Ringo, Indian Territory (A. N. Caudell); Dallas, Texas, August 13, 1906 (Crawford & Pratt); Baton Rouge, Louisiana (J. W. Dupree); Benoit, Mississippi, July 18, 1899 (———); Agricultural College, Mississippi, September 26, 1905 (W. V. Reed). Reported also from Church Hill, Tennessee (Morgan & Cotton).

Megarhinus septentrionalis was for a long time confused with other species, as the sexual dichromatism of the tarsi in the species of this genus was not recognized and it was thought that the species were subject to variation. They are, however, quite constant in markings. The first reference to this species is by Walker, who cites it under the name *Megarhina ferox* Wiedemann, but in an error of identification, since Wiedemann's *Culex ferox* is another species. Since then the males have been rather consistently referred to *portoricensis*, the females to *rutila*.

MEGARHINUS MOCTEZUMA Dyar & Knab.

Megarhinus moctezuma Dyar & Knab, Smiths. Misc. Colls., quart. iss., xlviii, 247, 248, 251, 1906.

Megarhinus montezuma Theobald, Mon. Culic., v, 602, 1910.

ORIGINAL DESCRIPTION OF MEGARHINUS MOCTEZUMA:

Male.—Head behind the eyes clothed with iridescent scales, at the sides and beneath silvery. Antennæ densely plumose; second segment longer than in *septentrionalis*, stout, laterally compressed, about as long as the three succeeding ones; heavily scaled along the crest. Palpi deep violet, on segments 2–4 scatteringly

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golden-scaled above and at the sides, entirely golden beneath, the apices pale lilac. Second and fourth segments of about equal length, the third longer, the fifth as long as the third and fourth together. Prothoracic lobes deep blue. Mesothorax dark brown on the disc with coppery scales; the median and lateral stripes of greenish blue scales; hind margin, scutellum and patches over the roots of the wings metallic blue. Pleurae and coxae silver-scaled with a tinge of yellow. Abdomen deep violet-blue, segments 6, 7 and 8 brilliant purple. First segment bright blue, more shining. Segments 2–7 with marginal golden spots, very narrow on the second segment and broadening to sixth and seventh where they become conspicuous patches. Segments 6, 7 and 8 margined behind with gold. Beneath pale golden, a narrow median blue line on segments 3–7; eighth segment entirely purple beneath. Lateral hairs pale yellow on segments 1–7, dark on the eighth and the genitalia. Legs dark with blue and purple lustre. Femora golden beneath. Front tibiae on the outside, middle tibiae on the inside, dull golden. Middle legs with the third tarsal segment white on the outside, a dash of silver at the base of the fourth segment. In the hind legs the fourth tarsal segment is white-ringed, black at its tip.

Female.—Antennæ: second segment somewhat longer than the third, slightly swollen basally, the basal two-thirds heavily clothed with purple scales. Palpi deep blue and purple, the segments pale at the apex; second and third segments with golden scales at the sides and beneath; second and third segments laterally compressed, the third slender at base, much thickened at apex; fourth segment stout and cylindrical, shorter than the second, the third twice as long as the fourth.

Abdomen greenish-blue merging into steel blue posteriorly, the eighth segment violet. Seventh segment finely margined with gold, eighth with terminal brush of bright yellow hairs. The hind angles of segments 2–8 marked with gold. Beneath golden, a dark median line ends before the eighth segment.

Fore and middle legs with the second and part of the third tarsal segments silvery white; hind legs with the fourth and upper half of the fifth tarsal segments white. The white on the front tarsi is not so brilliant as in the two preceding species and in *trinidadensis*.

Length, 6–9 mm.

Type No. 9953, U. S. N. M.

Localities: Sonsonate and Izalco in Salvador, Rio Aranjuez near Puntarenas in Costa Rica (F. Knab), Antigua in Guatemala (D. G. Eisen).

16 ♂, 2 ♀. In the male the white of the middle tarsi has a tendency to become silvery and less distinct; sometimes the silver at the base of the fourth segment is absent. In three specimens the white of the third segment extends entirely around it. Although the tarsal markings are the same as those of the preceding species it can be easily separated by the coloration of the thorax and other details. Preparations of the male genitalia of the two species reveal specific differences.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF MEGARHINUS MOCTEZUMA:

Female.—Proboscis rather long, curved, tapering to a point. Palpi long and stout, about two-thirds the length of the proboscis; long joint compressed, dilated towards apex, with a constriction at basal two-fifths; penultimate joint stout, cylindrical, one-third the length of long joint; terminal joint minute; vestiture metallic blue and purple, apices of segments pale lilac; segments brassy scaled beneath, except at bases and apices, and with scattered brassy scales on outer sides. Antennæ filiform, very delicate, the joints subequal, with whorls of long sparse hairs; second segment rather stout, about half as long again as the succeeding one, basal two-thirds with a dense crest of erect black scales; tori black with silvery pruinosity. Clypeus transverse, broadly rounded, deep brown with silvery pruinosity. Occiput clothed with flat, metallic-blue iridescent scales, ocular margin narrowly silver scaled; cheeks and head beneath silver scaled.

Prothoracic lobes prominent, covered with brilliant metallic blue scales and with a few coarse black setæ. Mesonotum clothed upon the disk with small brown scales with coppery ones intermixed, a median stripe and broad stripes on lateral margins involving anterior angles distinctly light metallic blue scaled; patches of brighter blue scales over roots of wings, basal region with numerous blue scales. Scutellum bright blue scaled in the middle, the sides broadly silvery blue scaled in continuation of lateral stripes of mesonotum. Postnotum chest-

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nut-brown, nude. Pleuræ and coxæ dark brown, densely clothed with silver scales with a slight yellowish tinge.

Abdomen depressed, broadest at middle; dorsal vestiture metallic blue with a greenish tinge basally and a deeper blue towards the tip, shading into violet on eighth segment; segments with rather small brassy lateral spots at hind angles; first segment brilliant blue scaled in the middle, silvery blue at the sides; venter clothed with brassy scales, a median longitudinal dark metallic blue line to tip of seventh segment; last segment with yellowish terminal bristles. No caudal tufts.

Wings narrow, with a slight smoky tinge; basal cross-vein oblique, reaching fourth vein beyond anterior cross-vein; costal vein purple scaled. Halteres pale, with black silver scaled knobs.

Legs slender; vestiture nearly black with blue and purple reflections; femora brassy beneath; front tibiæ dull golden on the outer side; middle tibiæ golden on inner side; front and middle tarsi with second segment and part of third silvery white; hind tarsi with fourth and basal two-thirds of fifth segments silvery-white. Claw formula, 0.0–0.0–0.0.

Length: Body 8 to 9 mm.; wing 7 mm.

Male.—Proboscis rather long, curved, tapering to a point. Palpi long and stout, slightly longer than the proboscis; long joint stout, about two-fifths the length of the entire palpus, with a false articulation before middle, its apex somewhat dilated; penultimate joint more than half the length of long joint, stout, somewhat compressed and slightly thickened at apex; terminal joint long, slender, slightly curved and tapering to a point, about equal to long joint; vestiture of all but the last joint of brilliant purple, brassy and blue scales, the darker scales massed at bases and apices of joints and around false articulation of long joint, extreme apices pale lilac; terminal joint very dark, purplish. Antennæ stout, densely plumose; last two joints long and slender, the others short and stout, subequal, brownish; second joint long, more than twice the length of the succeeding one, with a dense dorsal crest of erect silvery and purple scales; hairs of whorls dense, long, blackish; tori black with silvery pruinosity. Clypeus transverse, broadly rounded at the sides and slightly produced at middle; dark brown with silvery pruinosity. Occiput clothed with brilliant coppery and blue iridescent scales, ocular margin bluish-silvery; cheeks and head beneath silvery scaled. Prothoracic lobes prominent, brilliant blue and purple scaled and with a few coarse black hairs. Mesonotum clothed on the disk with brown scales with numerous bronzy ones intermixed, posteriorly a mixture of bronzy and blue scales; a median stripe and broad ones on lateral margins involving anterior angles light blue and well defined; patches of brilliant blue scales over roots of wings. Scutellum brilliant blue scaled in the middle, margin and sides silvery-blue; in one specimen some patches of bronzy scales on its disk. Abdomen depressed, rather slender, hardly broadened apically; dorsal vestiture of deep blue scales shading into violet-red on sixth, seventh, and eighth segments, sides of segments with yellowish-silvery spots, which are large and apical on sixth and seventh segments; sixth, seventh, and eighth segments finely margined behind with golden scales; venter pale-golden scaled, with a median steel-blue stripe, moderately broad to apex of fifth segment and very narrow on sixth and seventh segments, eighth segment violet-red; claspers covered with dark purple scales; lateral ciliation moderate, pale yellow, coarser and black on the eighth segment. Wings narrow, slightly smoky, particularly along front margin; basal cross-vein oblique and reaching fourth vein at or beyond anterior cross-vein. Legs nearly black, with violet and blue reflections; femora brassy beneath, knees silvery-white; front tibiæ with dull golden scales

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on outer side; middle tibiæ with dull golden scales on inner side; hind tibiæ with scattered golden scales on outer side; middle tarsi silver marked on outer side of second and basal half of third segment; hind tarsi with the fourth segment entirely brilliant white. Claw formula, 1.0–1.0–0.0.

Length: Body 9 to 11 mm.; wing 7 to 9 mm.

Genitalia (plate 37, fig. 246): Side-pieces over twice as long as wide, sharply conically tapered to rounded tips, a low basal lobe bearing four stout setæ. Clasp-filament slender, slightly attenuated before middle, bearing a long spine before tip. Harpes long, rather broad, margins revolute, tips bent outward, pointed, and with a few minute setæ. Harpagones wanting. Unci long, slender, subfilamentous, with bluntly pointed tips. A quadrate basal piece with setæ at its corners.

Larva, Stage IV (plate 128, fig. 444).—Head subquadrate, longer than wide, sides nearly straight, insertion of antennæ rather prominent; front margin deeply emarginate at middle, produced on each side of it into a large prominent lobe. Antennæ cylindrical, slender, rather long, smooth; two separate hairs at outer fourth, followed by a small tuft; three minute terminal digits and a seta. Mouth-brushes inserted on frontal lobes, each of ten stout, curved lamellæ with cleft tips. Mental plate broadly triangular, with a central tooth in a shallow emargination and nine subequal teeth on each side. Mandible quadrangular, straight without, smooth; two branched appendages at angle before tip; an outer row of coarse cilia; terminal dentition of five teeth, very large, ensiform, third and fifth smaller; a large rounded projection basad of the teeth, within which arises a row of long subequal setæ. Maxilla rounded quadrangular, basal angle with a group of flattened appendages with recurved tips; inner angle with shorter filaments, a seta, and two papillæ; palpus nearly separated by the suture, erect, columnar, flat at tip, smooth, with rudimentary terminal digits. Thorax rounded, about as wide as long; lateral hairs short, very stout, mostly singly from large tubercles, the heavy one coarsely spinulose. Abdomen stout, segments angled at sides, anterior ones shorter; hairs abundant, but not long, all the lateral hairs multiple to fifth segment, double on sixth, inserted on chitinous tubercles. Tracheal tubes broad, enlarged into bladders in the thorax, invisible in the living larva. Air-tube stout, slightly conically tapered outwardly, about three times as long as wide; no pecten; a single tuft near base. A large plate on sides of eighth segment with two stout spinulose hairs on its posterior margin. Anal segment about as long as wide, ringed by the plate, fringed behind with a row of spines; dorsal tufts of two long brushes on each side; a single spinulose lateral hair; ventral brush well developed, of branched tufts with long feathering; anal gills very short, bud-shaped.

The larvæ live in the thick dark brown water in broken and discarded cocoanuts, preying upon the larvæ of *Joblotia, Hæmagogus* and other species found therein. Mr. Knab took larvæ from cocoanut husks on two occasions. They perhaps also inhabit tree-holes and artificial receptacles, when in favorable situations. Mr. Knab found some adults resting upon low herbage in a wooded place in the daytime. When disturbed they would fly a short distance and alight upon another leaf, usually near the tip. Two of them that were frightened away returned to the same bush after a short time and none could be found away from the spot where they were first seen. The specimens were all males. In flying they made a shrill piping sound. Later, in the same place, after rain, two more males were taken upon the same bush and shortly after a female was found on the side of a tree-trunk close by. A thorough search of the vicinity revealed no more specimens.

Central America.

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Tapachula, State of Chiapas, Mexico (D. L. Crawford); Antigua, Guatemala, September, 1902 (G. Eisen); Sonsonate, Salvador, August 30, 1905 (F. Knab); Izalco, Salvador, August 21, 1905 (F. Knab); Rio Aranjuez, near Puntarenas, Costa Rica, September 13, 1905 (F. Knab).

MEGARHINUS GUADELOUPENSIS Dyar and Knab.

Megarhinus violaceus Coquillett (in part, not Wiedemann), U. S. Dept. Agr., Bur. Ent., Tech. Ser. No. 11, 14, 1906 (male).
Megarhinus guadeloupensis Dyar & Knab, Smiths. Misc. Colls., quart. iss., xlviii, 247, 248, 254, 1906.
Megarhinus guadeloupensis Theobald, Mon. Culic., v, 603, 1910.

ORIGINAL DESCRIPTION OF MEGARHINUS GUADELOUPENSIS:

Female.—Head pearly green and blue above, silvery at the sides and beneath. Antennæ very slender; the second segment not stouter and more than twice as long as the third, without crest of erect scales. Palpi slender, cylindrical, violet, the apices of the segments mauve; third segment laterally compressed, thickened at the apex, nearly twice as long as the fourth; fourth segment shorter than second. Prothoracic lobes bright blue. Mesothorax metallic green and blue, the two colors of about equal strength, the blue in a median line and at the sides. At the roots of the wings and on the scutellum patches of bright, almost brassy, scales. Pleuræ and coxæ silvery with a yellowish tinge. Abdomen passing from dull greenish through blue and violet on the seventh segment to golden purple on the eighth. Eighth segment with dark bristles. Ventral surface entirely golden.

Legs deep violet, the femora golden beneath. Front tarsi unicolorous; middle tarsi with the second segment white on the outside (3–5 missing); hind tarsi with the fourth segment partly white.

Male.—Antennæ slender, sparsely plumose; the second segment but little stouter than the following ones, slightly longer than the third and fourth together, without crest of scales. Palpi long and slender; the second segment is a trifle shorter than the third, the third and fourth are of nearly equal length, the fifth longer than these two together. The coloration of the body is similar to that of the female. The legs are entirely dark without a trace of white on any of the tarsi.

Length, 5–7 mm.

Type No. 9956, U. S. N. M.

Locality: Guadeloupe, West Indies (A. Busck).

1 ♀, 1 ♂. Bred from larvæ found together in Bromelia water. The male is much denuded. Mr. Coquillett's characterization of the male *M. violaceus* is based on this specimen. The palpi are remarkably slender in this species, a particularly noticeable feature in the female. Another unique feature is the absence of erect scales on the second antennal segment in both sexes.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF MEGARHINUS GUADELOUPENSIS:

Female.—Proboscis rather long, curved, tapering to a point. Palpi long, rather slender, nearly two-thirds the length of the proboscis; long joint rather stout, compressed, clavate, with a constriction at basal two-fifths; penultimate joint cylindrical, about two-fifths as long as the preceding; terminal joint minute; vestiture deep violet, beneath dark golden scaled, apices of segments bright metallic violet. Antennæ filiform, very delicate, the joints subequal, with whorls of sparse hairs; second segment less than twice the length of the following one and but little stouter, without dorsal crest of scales; tori deep brown with silvery pruinosity. Clypeus transverse and broadly rounded, dark brown with silvery pruinosity. Occiput covered with flat bright bluish-green iridescent scales, ocular margins narrowly silver-white; cheeks and head beneath silvery scaled.

Prothoracic lobes very prominent, covered with bright metallic blue scales and bearing a few coarse black setæ. Mesonotum clothed with small deep brown scales on the disk, a median stripe metallic-blue, lateral margins broadly light greenish-blue and subdorsal stripes of greenish scales becoming confluent with the lateral margins in front, posteriorly the blue scales diffused over entire surface; patches over roots of wings bright greenish-silvery. Scutellum clothed

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with broad, flat, bright greenish-silvery scales. Postnotum brown, nude. Pleuræ and coxæ luteous-brown, densely clothed with silver scales with a yellowish tinge.

Abdomen subcylindrical, dorsally depressed; dorsal vestiture bluish-green at base, passing into deep blue and then into violet-red on last two segments, a series of segmental yellowish-silvery lateral spots, broadest basally; first segment light metallic blue scaled with greenish reflections; last segment with black terminal bristles; no caudal tufts; venter entirely pale golden scaled.

Wings broader than in any of preceding species, hyaline with a slight smoky tinge, particularly on anterior portion; basal cross-vein oblique, contiguous with anterior cross-vein; costal vein dark purple scaled. Halteres pale, with dark silver scaled knobs.

Legs slender, dark reddish-purple scaled; femora brassy beneath: middle tarsi with second segment white-marked on outer side; hind tarsi with fourth segment white marked to near apex. Claw formula, 0.0–0.0–0.0.

Length: Body 8 mm.; wing 6 mm.

Male.—Proboscis rather long, curved and tapering to a point. Palpi long, about as long as the proboscis, slender; long joint about two-fifths the entire length of the palpi, compressed, with a false articulation about two-fifths from base, and dilated at apex; penultimate joint about three-fifths the length of the preceding and about equally stout, compressed; terminal joint about as long as long joint, slender, slightly curved and tapering to a point; vestiture deep violet, false articulation and apices of all the joints but the last light shining blue scaled. Antennæ rather delicate, plumose, but much less densely than in the other species; last two joints long and slender, the others short and stout, cylindrical, luteous, with basal whorls of long, moderately abundant hairs; second segment slightly over twice as long as the succeeding one and but a trifle stouter, without crest of scales; tori black with silvery pruinosity. Clypeus rather large and prominent, broadly rounded at the sides and very slightly produced at the middle, brown with silvery pruinosity. Mesonotum much denuded in the unique specimen; the remaining scales indicate a correspondence of the thoracic pattern with that of the female. Abdomen elongate, depressed; dorsal vestiture dark blue with a greenish tinge at base; venter entirely pale golden scaled. Wings slightly narrower than in the female; costal vein bearing dull coppery scales; basal cross-vein oblique and reaching fourth vein nearly its own length behind anterior cross-vein. Legs long and slender; vestiture nearly black, with a violet reflection; bases and under sides of femora brassy. Claw formula, 1.0–1.0–0.0.

Length: Body 6 mm.; wing 5 mm.

Genitalia (plate 36, fig. 244): Side-pieces over twice as long as wide, sharply tapered to a narrow rounded apex; basal lobe broad, rounded, clothed with similar setæ to those on side-pieces. Clasp-filament long and slender, as long as side-piece, nearly uniform, smooth, with a long slender articulated terminal spine and a few minute setæ near tip. Harpes large, prominent, narrow, concave, margins revolute, tip thickened and bent, pointed, and with a few minute setæ. Unci conical at base, tip produced into long points, dentate within. Basal appendages forming a low broad rounded quadrate prominence, with a tuft of setæ at each angle.

Larva, Stage IV (plate 127, fig. 443).—Head subquadrate, slightly longer than wide, sides nearly straight; antennæ on a slight prominence; front deeply emarginate at middle, a prominent lobe on each side of it. Antennæ slender, rather long, cylindrical, slightly curved; two hairs and a small tuft before tip. Mouth-brushes inserted beneath apices of anterior lobes, folded downward and

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backward, each composed of ten stout lamellæ with curved tips. Mandibles quadrangular, smooth; a long appendage before tip; an outer row of coarse cilia; terminal dentition of four teeth, very large, ensiform, the third small, a rudimentary fifth shown. Maxilla rounded quadrangular, excavate in the middle; basal angle with a group of flattened appendages with recurved tips; inner angle with shorter setæ; palpus nearly separated by a suture, erect, columnar, flat at tip, with rudimentary digits. Thorax rounded, about as wide as long; lateral hairs short, very stout, the heaviest ones spinulose. Abdomen stout, the segments angled at the sides, the anterior ones narrow and transverse; hairs moderately long, the lateral ones multiple. Eighth segment with a large chitinous plate at the sides, bearing two stout spinulose hairs on its distal margin. Air-tube stout, about three and a half times as long as broad, slightly tapered, without pecten and with a multiple tuft close to base beneath. Anal segment nearly as long as broad, ringed by the plate, which has a spinulose apical margin; dorsal tufts of two long brushes on each side; a single spinulose lateral hair; ventral brush well developed, the tufts with long feathering; anal gills very short, bud-like.

The larvæ live in the water at the leaf-bases of Bromeliaceæ and feed upon the other mosquito larvæ occurring therein.

Island of Guadeloupe, West Indies.

La Soufrière, July 30, 1905 (A. Busck).

We have only the single pair of specimens brought home by Mr. Busck. It is probable that the species inhabits neighboring islands also.

MEGARHINUS HYPOPTES Knab.

Megarhina ferox Macquart (not Humboldt, not Wiedemann), Mém. Soc. roy. des Sci., de l'Agr. et des Arts de Lille, 1844; Dipt. exot., Suppl., 1, 7, 1846.

Megarhinus hypoptes Knab, Can. Ent., xxxix, 50, 1907.

Megarhinus trinidadensis Busck (not Dyar & Knab), Smiths. Misc. Colls., quart. iss., lii, 60, 1908.

Megarhinus hypoptes Busck, Smiths. Misc. Colls., quart. iss., lii, 60, 1908.

Megarhinus hypoptes Theobald, Mon. Culic., v, 90, 1910.

ORIGINAL DESCRIPTION OF MEGARHINUS HYPOPTES:

Male: Head behind the eyes velvety-black, the eyes broadly bordered with light metallic-blue, beneath and at the sides silvery. Antennæ densely plumose; the toruli with silvery lustre; second segment long and stout, longer than the three succeeding ones, somewhat compressed laterally, the heavy scaling of the crest condensed to a prominent iridescent blue patch on the anterior portion. Palpi metallic-blue and purple, segments 2 to 4 pale lilac at the tip, second and fourth segments nearly equal, the third longer, fifth twice as long as the fourth. Prothoracic lobes deep metallic-blue. Mesothorax greenish-black on the disk, with a few coppery scales intermixed; the anterior and posterior margins, an ill-defined median line and patches at the middle of the sides metallic-blue. Scutellum and post-scutellum bright metallic-blue. Pleura and coxæ silvery. Abdomen above deep blue, passing from greenish to a violaceous-tinge towards the tip, segments 6, 7 and 8 marked with gold at the hind angles, the seventh with a fine golden hind margin. Claspers violet-scaled. Sixth and seventh segments laterally expanded, reaching their greatest width at the tip of the seventh. No caudal tufts. Lateral abdominal cilia pale on all the segments but the last, dark on the eighth and the genitalia. Abdomen beneath yellowish-silvery, with a median blue stripe. The stripe is widest on the third and fourth segments, and narrows to a fine line on the sixth and seventh. Eighth segment violaceous beneath, tipped with gold. Legs deep violet and blue, the hind tarsi only white-marked. Under surface of the femora bright brassy. On the hind legs the fourth and fifth tarsal joints are silvery-white on the outer side, black on the inner. Length, 9.5 mm. (exclusive of appendages).

Type.—Cat. No. 10,146, U. S. Nat. Mus.

Locality.—Bluefields, Nicaragua. (W. F. Thornton.)

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DESCRIPTION OF FEMALE, MALE, AND LARVA OF MEGARHINUS HYPOPTES:

Female.—Proboscis rather long, curved, tapering to a point. Palpi long, rather stout, nearly two-thirds the length of the proboscis; long joint rather stout, compressed, with a constriction at basal two-fifths; penultimate joint cylindrical, about two-fifths the length of the preceding; terminal joint minute; vestiture deep violet-blue, long joint golden-scaled beneath, penultimate joint with scattered golden scales on the inner side; apices of joints and false articulation pale lilac scaled. Antennæ filiform, delicate, the joints subequal, with whorls of very sparse hairs; second segment nearly twice the length of third and but little stouter, its basal half with a crest of erect dark scales; tori black with silvery pruinosity. Clypeus transverse and broadly rounded, black, with silvery pruinosity. Occiput covered with flat, brilliant dark blue scales, margins of eyes narrowly silvery-white; cheeks and head beneath silvery scaled.

Prothoracic lobes very prominent, covered with flat, brilliant blue scales and bearing a few coarse black setæ. Mesonotum predominatingly metallic-blue scaled, a pair of subdorsal brown stripes, broad in front and narrowing posteriorly, not reaching the base; lateral margins involving anterior angles broadly silvery-blue scaled; roots of wings brilliant blue scaled. Scutellum bright blue scaled in the middle, silvery-blue at the sides. Postnotum chestnut-brown, nude. Pleuræ and coxæ luteous-brown, densely silver scaled.

Abdomen subcylindrical, dorsally depressed; dorsal vestiture metallic greenish-blue at base, deeper blue towards apex, a series of segmental, lateral pale golden spots, which become apical on sixth and seventh segments; first segment bright silvery-blue scaled; eighth segment entirely violet golden; venter pale golden-scaled, with median longitudinal violet-blue line, narrowest on seventh segment; eighth segment mostly violet-blue scaled; lateral cilia pale yellowish, terminal bristles black; no caudal tufts.

Wings rather narrow, hyaline with a slight smoky tinge, particularly on anterior portion; costal vein dark purple scaled; basal cross-vein oblique, contiguous with anterior cross-vein. Halteres pale, with black silver scaled knobs.

Legs slender, dark blue and violet scaled, femora brassy beneath; front tarsi with second and third joints silver-blue scaled all around; middle tarsi with second and nearly all of third joints silver-white scaled all around, some white scales at base of fourth joint; hind tarsi with apex of third and all of fourth and fifth joints silver-white scaled all around. Claw formula, 0.0–0.0–0.0.

Length: Body about 7 mm.; wing 6 mm.

Male.—Proboscis rather long, curved, tapering to a point. Palpi long, somewhat exceeding the proboscis in length; long joint rather stout, somewhat compressed, apex dilated, with a false articulation before the middle; penultimate joint slightly more than half the length of preceding, equally stout and somewhat compressed; terminal joint about as long as long joint, slender, slightly curved and tapering to a point; vestiture metallic blue and purple, false articulation and apices of all but last joint silvery-violet scaled; long joint mostly brassy scaled at the sides and beneath. Antennæ rather stout, densely plumose; last two joints long and slender, the others short, stout, cylindrical, with basal whorls of long dense hairs; second segment about three times as long as the succeeding one, rather stout and with a dense crest of scales, black on basal half and metallic blue apically; tori black with silvery pruinosity. Clypeus transverse, broadly rounded, black with silvery pruinosity. Occiput metallic-blue, ocular margins brighter blue. Mesonotum clothed on the disk with deep brown, greenish-black and coppery-bronze scales intermixed, lateral margins broadly bright metallic blue scaled; also indications of a median and subdorsal stripes; patches of brilliant blue scales over roots of wings. Scutellum clothed

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with brilliant dark blue scales. Abdomen elongate; dorsal vestiture deep blue, at base with a greenish tinge, at apex shading into violet; lateral margins of segments silver marked with a yellowish tinge, expanded at apical angles of sixth and seventh segments, which are also finely margined behind with silver; vestiture of eighth segment almost black and with apical spots of yellowish silvery scales; claspers purple scaled; venter silver scaled with a yellowish tinge and with a steel-blue median longitudinal stripe, broad in front, narrow posteriorly, becoming linear on the seventh segment; eighth segment deep blue scaled beneath; lateral ciliation short, pale yellowish, eighth segment with coarse black hairs. Wings narrow; basal cross-vein oblique, reaching fourth vein just behind anterior cross-vein. Legs slender, very deep violet and blue scaled; femora brassy scaled beneath; middle tarsi with second segment brighter metallic blue on outer side; hind tarsi with fourth and fifth segments clear white on outer side, black on inner side. Claw formula, 1.0–1.0–0.0.

Length: Body 9.5 mm.; wing 7.5 mm.

Genitalia (plate 36, fig. 241): Side-pieces over twice as long as wide, tapering to the narrowly rounded tips; basal lobe low, conical, with stout setæ at tip and small ones basally. Clasp-filament long and slender, nearly as long as side-piece, with an articulated terminal spine, and minute setæ beyond middle. Harpes prominent, large, concave, margin revolute, tip bent outward and pointed. Unci conical at base, tips produced into long points, dentate within. Basal appendages forming a rounded quadrate prominence, with setæ on the two lateral angles.

Larva, Stage IV (plate 128, fig. 445).—Head rounded subquadrate, slightly longer than wide, front strongly emarginate at middle, with a prominent lobe on each side of it. Mouth-brushes of ten lamellæ, curved, inserted under apices of anterior lobes. Antennæ rather long, very slender, smooth, with small setæ beyond middle. Dorsal head-hairs single, grouped in vicinity of antennæ. Eighth abdominal segment with a lateral plate with irregular angled corners, bearing two stout feathered setæ on its posterior border and two minute tufts. Air-tube over three times as long as wide, slightly tapering outwardly, smooth, a single hair-tuft close to base. Anal segment with a broad chitinous ring which bears a fringe of long spines on its posterior margin; dorsal tufts of two groups of long hairs on each side; lateral hair thick and feathered; ventral brush well developed, composed of hairs with long featherings; anal gills short, bud-shaped, rounded, subequal.

The larvæ live in the water in broken bamboo-stems. Mr. Busck and Mr. Jennings obtained them only in their bamboo-traps. The prey must be the larvæ of the species of *Hæmagogus, Wyeomyia* and others that live in such locations. Mr. Jennings bred one specimen, together with another of *Megarhinus superbus,* from a larva found in water at the leaf-bases of a terrestrial bromeliad.

Central America.

Bluefields, Nicaragua (W. F. Thornton); Tabernilla, Canal Zone, Panama, May 21, 1907 (A. Busck), June 30, July 24, September 3, 1908, and February 4, 1909 (A. H. Jennings). Reported also by Macquart, but without locality.

According to Macquart's good description, this is the species he had before him under the name *Megarhina ferox* in 1844, but not the one so named by him in 1834 (Hist. Nat. des Ins., Dipt. I, 33, 1834). This latter appears to have been one of the Brazilian species not now before us.

MEGARHINUS PORTORICENSIS von Röder.

Megarrhina portoricensis von Röder, Ent. Zeit., Stettin, xlvi, 337, 1885.
Megarhina portoricensis Giles, Handb. Gnats or Mosq., 133, 1900.
Megarhina sp. (from St. Domingo) Giles, Handb. Gnats or Mosq., 137, 1900.
Megarhinus portoricensis Theobald (in part), Mon. Culic., I, 232, 1901.

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Megarhina portoricensis Giles (in part), Handb. Gnats or Mosq., 2 ed., 275, 1902.
Megarhinus portoricensis Blanchard (in part), Les Moust., 224, 1905.
Megarhinus portoricensis Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 14, 1906.
Megarhinus portoricensis Dyar & Knab, Smiths. Misc. Colls., quart. iss., xlviii, 247, 1906.
Megarhinus haitiensis Dyar & Knab, Smiths. Misc. Colls., quart. iss., xlviii, 248, 253, 1906.
Megarhinus portoricensis Theobald, Mon. Culic., iv, 129, 1907.
Megarhinus portoricensis Pazos, San. y Benef., ii, 46, 186, 1909.
Megarhinus portoricensis Theobald (in part), Mon. Culic., v, 93, 1910.
Megarhinus haitiensis Theobald, Mon. Culic., v, 602, 1910.

ORIGINAL DESCRIPTION OF MEGARHINA PORTORICENSIS:

Thorace badio viridi-aureo squamulato, abdomine pedibus palpisque chalybeis; tarsorum posticorum articulo paenultimo argenteo.

Patria: Insula Portorico. (Long. 8 mm ♂.)

Fühler bräunlich; Taster stahlblau, in das Veilchenblaue übergehend. Rüssel lang, stahlblau. Kopf am hinteren Augenrande und vorn um das erste Fühlerglied weiss schimmernd. Thorax dunkelbraun, mit grüngoldenen Schuppen (die aber bei dem mir vorliegenden Exemplar theilweise abgerieben sind). An den Brustseiten befinden sich über den Hüften silberweiss behaarte Flecke. Schildchen mit grüngoldenen Schuppen. Hinterleib schön stahlblau, an den äussersten Seitenrändern weisslich schimmernd. Beine stahlblau, die Hüften silberweiss beschuppt; die Schenkel an der Unterseite goldgelb beschuppt; das vorletzte Fussglied an den Hintertarsen ist silberweiss beschuppt. Adern der Flügel am Vorderrande mehr dunkel gesäumt, gegen den Hinterrand heller. Schwinger hell.

ORIGINAL DESCRIPTION OF MEGARHINUS HAITIENSIS:

Female.—Head above pearly blue, at the sides and beneath silvery. Antennae: second segment twice as long as the third, hardly stouter, swollen basally, a crest of scales on the basal half. Palpi deep blue and violet with a few silvery scales, segments pale at the apex. Fourth segment cylindrical, slightly shorter than the second; third longest, nearly twice as long as the fourth. Prothoracic lobes bright blue. Mesothorax very dark blue on the disc, a median lighter blue stripe bounded at the sides by a patch of dull brown scales, the sides pale bluish. Scutellum, roots of the wings, and first abdominal segment silvery blue and green-scaled. Pleurae and coxae silvery. Abdomen deep blue, the seventh and eighth segments violet. Sides silvery. Venter pale golden with a broad median blue area. Eighth segment with terminal bristles.

Legs dark blue and violet. Femora pale golden beneath. Hind tarsi only marked with white—the fourth segment, all but its tip.

Male.—Antennae densely plumose; second segment stout, as long as the next three; its crest densely clothed with semi-erect scales. Palpi blue and violet, segments 2, 3 and 4 with scattered golden scales and pale mauve apices. Second segment slightly shorter than fourth, third slightly longer; the fifth longer than the third and fourth together. Mesothorax with blue median line becoming green posteriorly and merging into the color of the scutellum. On each side of the blue median line a dull brown stripe from the front to the basal third. Well forward and close to the pale lateral stripe is a patch of very dark blue scales; behind this, along the basal half, is another stripe of dull brown. All these markings are obscured by a sprinkling of bright green scales. Over the roots of the wings are patches of brilliant blue scales. Abdomen blue, violet on the seventh and eighth segments. Light spots at the sides of some of the segments. Under side silvery with a median blue stripe, the eighth segment violet, the ninth with a silvery spot. Lateral hairs pale yellow, dark on the eighth and ninth segments.

Legs deep blue and violet. Under side of femora silvery or pale golden. Hind tarsi with the fourth segment mostly white.

Length, 7–9 mm.

Type: No. 9955, U. S. N. M.

Locality: San Francisco Mts., Santo Domingo, West Indies (A. Busck).

3 ♂, 1 ♀. Bred from larvae found in tree-holes. The male and female agree in tarsal markings and our specimens show no variation. The difference in the marking of the thorax of the female are due to abrasion, the description of the male shows the appearance in perfect specimens. This is the only species we have seen in which the tarsal markings are identical in the two sexes.

The description of *portoricensis*, as far as it goes, agrees with our species. The species is founded on a single male. Until we can compare specimens of both sexes from Portorico we assume the Santo Domingan form to be a distinct species.

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DESCRIPTION OF FEMALE, MALE, AND LARVA OF MEGARHINUS PORTORICENSIS:

Female.—Proboscis rather long, curved, tapering to a point. Palpi stout and long, about two-thirds the length of the proboscis; long joint compressed, with a constriction at the basal two-fifths; penultimate joint stout, cylindrical, about two-fifths as long as preceding; terminal joint minute; vestiture metallic blue and purple, beneath mostly brassy scaled; false articulation and apex of long joint pale violet scaled. Antennæ filiform, slender, the joints subequal, with whorls of long, very delicate hairs, almost plumose; second joint nearly half as long again as the succeeding one, on its basal half a dorsal crest of erect black scales; tori black with silvery pruinosity. Clypeus transverse, broadly rounded, black with silvery pruinosity. Occiput covered with flat bright blue and green iridescent scales, ocular margins broadly silvered; cheeks and head beneath silvery scaled.

Prothoracic lobes very prominent, covered with flat metallic-blue scales and bearing a few coarse black setæ. Mesonotum much denuded in the unique specimen; scales on the disk dark brown with metallic dark blue ones scattered about; lateral margins broadly light metallic blue, and a trace of a blue median stripe; posteriorly many bright green scales, and over roots of wings patches of brilliant blue scales. Scutellum covered with bright silvery-blue scales. Postnotum brown, nude. Pleuræ and coxæ deep brown, covered with silvery scales.

Abdomen subcylindrical, but slightly larger at the middle, with a slight dorsal ridge on basal half; dorsal vestiture of dark metallic-blue scales which shade off into violaceous on the seventh and eighth segments, a series of narrow segmental lateral spots of silvery-white; first segment bright silvery-blue scaled; venter very pale golden scaled, with a median longitudinal stripe of metallic dark blue scales; tip of abdomen with coarse yellowish bristles; no caudal tufts.

Wings rather narrow, clear, with smoky tinge on anterior margin; costal vein dark purple scaled; basal cross-vein oblique, close to anterior cross-vein. Halteres pale, with black silver scaled knobs.

Legs slender; vestiture dark metallic-blue and purple; knees white; under sides of femora silvery; fourth segment of hind tarsi brilliant white, black at tip. Claw formula, 0.0–0.0–0.0.

Length: Body 8 mm.; wing 6.5 mm.

Male.—Proboscis rather long, curved, tapering to a point. Palpi rather stout, very long, slightly longer than the proboscis; long joint stout, somewhat compressed, dilated at apex, a false articulation about two-fifths from base; penultimate joint stout, slightly dilated at tip, about three-fifths the length of the preceding; terminal joint about as long as long joint, slender, very slightly curved and tapering to a point; vestiture metallic-blue and purple, false articulations and apices of all but last joint light shining blue, beneath and at the sides all but the last joint mostly brassy scaled. Antennæ stout, very densely plumose; last two joints long and slender, the others short, stout, cylindrical, with basal whorls of long dense black hairs; second segment long and stout, compressed, more than twice the length of the succeeding one and bearing a crest of erect purplish iridescent scales; tori deep brown, covered with silvery pruinosity. Clypeus broadly rounded, somewhat produced at middle, deep brown. Occiput bright metallic-blue scaled, ocular margins silvery; cheeks and head beneath silvery scaled. Prothoracic lobes prominent, clothed with flat, brilliant metallic-blue scales and bearing a few coarse black setæ. Mesonotum clothed with deep brown scales on the disk, lateral margins involving anterior angles and a median stripe light metallic-blue and green scaled; on posterior half of disk ill defined subdorsal stripes of metallic blue and green scales, and these predominate toward posterior margin; anteriorly close to the margin are elongate patches of metallic, very deep blue scales; patches of

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brilliant light blue scales over roots of wings. Scutellum light greenish-blue scaled at the middle, silvery-blue at the sides. Abdomen elongate; dorsal vestiture deep metallic-blue, seventh and eighth segments brilliant violet; sides of segments silver marked; claspers violet scaled; venter silver scaled, with a rather broad metallic-blue median stripe, eighth segment violet at base, silvery at tip; lateral ciliation short, delicate, and pale. Wings narrow; basal cross-vein oblique, in one specimen reaching the fourth vein far behind a very small anterior cross-vein; in the two other specimens the cross-veins are contiguous or nearly so. Legs slender; vestiture very dark blue and purple, knees white; under sides of femora golden scaled; front tibiæ with brassy scales on inner side, middle tibiæ with brassy scales on outer side; fourth segment of hind tarsi brilliant white, black at apex. Claw formula, 1.0–1.0–0.0.

Length: Body 7 to 9 mm.; wing 6 to 9 mm.

Genitalia (plate 36, fig. 240): Side-pieces over twice as long as wide, sharply tapered to a narrow rounded tip; basal lobe, low, rounded, with coarse setæ on summit and small ones basally. Clasp-filament long and slender, nearly as long as side-piece, smooth, with a long articulated terminal spine. Harpes large, prominent, concave, with revolute margins, tip bent outward, acuminate, with several minute setæ. Unci with elliptical base, tips slender and produced, serrate within. Basal appendages remote, rounded, setose, connected by a broad, shallow emargination.

Larva, Stage IV (plate 127, fig. 440).—Head subquadrate, longer than wide, sides nearly straight, antennæ on a slight prominence; front deeply emarginate at middle, a prominent lobe on each side of it. Antennæ rather long, slender, cylindrical, scarcely tapered terminally, smooth; two separate hairs at outer fourth followed by a short multiple tuft; three small terminal digits and a seta. Mouth-brushes inserted on anterior lobes of head, lamellate, folded downward and backward. Mental plate broadly triangular, an apical tooth in a shallow sinus; nine stout subequal teeth on each side; other toothed plates superposed. Mandible quadrangular, straight without, smooth; two branched appendages at the angle before tip; an outer row of coarse cilia; terminal dentition of five very large teeth, ensiform, the third and fifth smaller. Maxilla rounded quadrangular, excavate at tip, basal angle with a group of flattened appendages with recurved tips; inner angle with shorter filaments; palpus nearly separated by a suture, erect, columnar, flat at tip, smooth, with rudimentary terminal digits. Thorax rounded, about as long as wide; lateral hairs short, very stout, the heaviest ones spinulose. Abdomen stout, the segments angled on the sides, anterior ones narrow and transverse; hairs abundant, moderately long, all the lateral hairs multiple to fifth segment, double on sixth. Tracheal tubes large, expanded into bladders in the thorax. Air-tube stout, slightly conically tapered outwardly, about two and a half times as long as wide; no pecten; a single tuft near base. A large plate on sides of eighth segment, with two stout spinulose hairs on its posterior margin. Anal segment about as long as wide, ringed by the plate, which is fringed with spines behind; dorsal tufts of two long brushes on each side; a single spinulose lateral hair; ventral brush well developed, of branched feathered tufts; anal gills very short, bud-shaped.

The larvæ inhabit water in holes in trees. Mr. Busck found them twice in holes in palm-trunks and once in another tree not specifically mentioned. They feed upon the larvæ of *Aëdes mediovittata* and other species inhabiting hollow trees.

Greater Antilles.

San Francisco Mountains, Santo Domingo, September, 1905 (A. Busck); Cuba (Osten Sacken, specimen in the Museum of Comparative Zoology, Cambridge, Massachusetts). Reported also from Porto Rico (von Röder).

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The specimen which we have examined from Cuba is in very poor condition, but as well as we are able to judge, belongs to this species. Theobald, in the fourth volume of the Monograph of Culicidæ, places the species correctly in his synoptic table, but adds "caudal tuft steel-blue and white." The specimens before us have no caudal tufts whatever, although they are bred and in excellent condition, and we can only regard this statement as erroneous. It originated, apparently, in Colonel Giles's work, and has been carelessly reproduced by other authors without personal verification.

The records of *Megarhinus portoricensis*, by Williston from St. Vincent (Trans. Ent. Soc. Lond., 1896, 270), and by Theobald, from Georgia, Mississippi, Pará, Brazil, and Grenada (Mon. Culic., i, 233, 1901; v, 93, 1910) we believe to be based on misidentifications. The specimens so reported from localities in the United States are unquestionably males of *M. septentrionalis*. We have not seen specimens of *M. portoricensis* from the Lesser Antilles or South America and we do not believe that it occurs there; the fauna of the lesser islands is, in the main, distinct from that of the Greater Antilles and nearly related to that of South America. It should be further noted that the males of *Megarhinus septentrionalis* were for many years identified as *M. portoricensis* by Mr. Coquillett and that this led to many erroneous records.

Group ANOPHELINES.

Genus ANOPHELES Meigen.

Anopheles Meigen, Syst. Beschr. bek. europ. zweifl. Ins., i, 10, 1818.
Anopheles Wiedemann, Dipt. Exot., 10, 1821.
Anopheles Macquart, Recueil des trav. Soc. d'Amat. Sci. Agr. et Arts de Lille, 162, 1825.
Anopheles Robineau-Desvoidy, Mém. Soc. d'Hist. Nat., iii, 403, 410, 1827.
Anopheles Latreille, Cuvier's Regne Animal, 2 ed., v, 439, 1829.
Anopheles Macquart, Hist. nat. des Ins., Dipt., i, 32, 1834.
Anopheles Macquart, Mém. Soc. Roy. Sci. Agr. et Arts de Lille, ii, 35, 1838.
Anopheles Macquart, Dipt. Exot., i, 1, 31, 1838.
Anopheles Blanchard, E., Hist. nat. des Ins., iii, 564, 1841.
Anopheles Loew, Dipt. Beitr., i, 3, 1845.
Anopheles Meigen, Syst. Beschr. bek. europ. zweifl. Ins. (reprint), i, 8, 1851.
Anopheles Schiner, Fauna Austr., Die Fliegen (Dipt.), ii, 624, 1864.
Anopheles Van der Wulp, Dipt. Neerlandica, 322, 329, 1877.
Anopheles Skuse, Proc. Linn. Soc. N. S. W., 2 ser., iii, 1751, 1889.
Anopheles Lynch Arribálzaga, Rev. Mus. de La Plata, i, 372, ii, 134, 1891.
Anopheles Townsend, Trans. Am. Ent. Soc., xix, 149, 1892.
Anopheles Ficalbi, Bul. Soc. Ent. Ital., xxxi, 123, 1899.
Anopheles Coquillett, U. S. Dept. Agr., Div. Ent., Circular, 40, 2d ser., 4, 1900.
Anopheles Howard, U. S. Dept. Agr., Div. Ent., N. Ser., Bull. 25, 19, 1900.
Anopheles Giles, Handb. Gnats or Mosq., 139, 1900.
Anopheles Howard, Mosquitoes, 91, 235, 1901.
Anopheles Grassi, Studi di uno zool. sulla Malaria, 2 ed., 95, 1901.
Cycloleppteron Theobald, Journ. Trop. Med., iv, 234, 1901 (without species).
Anopheles Theobald, Journ. Trop. Med., iv, 234, 1901.
Cyclolepidopteron Blanchard, C. R. Soc. Biol., liii, 1046, 1901.
Anopheles Theobald, Mon. Culic., i, 115, 1901.
Cycloleppteron Theobald, Mon. Culic., i, 205, ii, 312, 1901.
Anopheles Theobald, Journ. Trop. Med., v, 181, 1902.
Grassia Theobald (not Fisch); Journ. Trop. Med., v, 181, 1902.
Cycloleppteron Theobald, Journ. Trop. Med., v, 181, 182, 1902.
Stethomyia Theobald, Journ. Trop. Med., v, 181, 182, 1902.
Howardia Theobald (not Dalla Torre), Journ. Trop. Med., v, 181, 182, 1902.
Rossia Theobald (not Bonaparte, not Owen), Journ. Trop. Med., v, 181, 183, 1902.
Laverania Theobald (not Grassi and Feletti), Journ. Trop. Med., v, 181, 183, 1902.
Cellia Theobald, Journ. Trop. Med., v, 183, 1902.
Myzomyia Blanchard, C. R. Soc. Biol. Paris, liv, 795, 1902.
Pyretophorus Blanchard, C. R. Soc. Biol. Paris, liv, 795, 1902.
Myzorhynchus Blanchard, C. R. Soc. Biol. Paris, liv, 795, 1902.
Nyssorhynchus Blanchard, C. R. Soc. Biol. Paris, liv, 795, 1902.
Anopheles, Myzomyia and *Cyclolepidopteron* Neveu-Lemaire, C. R. Soc. Biol. Paris, liv, 1330, 1902.

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Anopheles Dönitz. Zeitschr. Hygiene u. Infectionskrankh., xli, 31, 1902.
Anopheles Giles, Handb. Gnats or Mosq., 2 ed., 280, 281, 1902.
Cycloleppteron Giles, Handb. Gnats or Mosq., 2 ed., 280, 331, 1902.
Anopheles Neveu-Lemaire, Mém. Soc. Zool. France, xv, 204, 1902.
Anopheles Theobald, Mon. Culic., iii, 17, 1903.
Myzomyia Theobald, Mon. Culic., iii, 24, 1903.
Cycloleppteron Theobald, Mon. Culic., iii, 55, 1903.
Stethomyia Theobald, Mon. Culic., iii, 62, 1903.
Pyretophorus Theobald, Mon. Culic., iii, 66, 1903.
Arribalzagia Theobald, Mon. Culic., iii, 81, 1903.
Myzorhynchus Theobald, Mon. Culic., iii, 84, 1903.
Nyssorhynchus Theobald, Mon. Culic., iii, 92, 1903.
Cellia Theobald, Mon. Culic., iii, 107, 1903.
Aldrichia Theobald, Mon. Culic., iii, 353, 1903.
Christya Theobald, Repts. Sleep. Sickn. Comm., Roy. Soc. Lond., iii, 34, 1903.
Cycloleppteron and *Anopheles* Coquillett, Rev. de Med. Trop., iv, 113, 1903.
Anopheles Johannsen, Bull. 68, N. Y. State Mus., 390, 391, 392, 405, 1903.
Lophomyia Giles, Journ. Trop. Med., vii, 366, 1904.
Anopheles, *Stethomyia*, *Cycloleppteron*, *Myzomyia*, *Pyretophorus*, *Myzorhynchus*, *Arribalzagia*, *Chrystya*, *Nyssorhynchus*, *Cellia* and *Aldrichia* Giles, Revision of the Anophelinæ, 23–46, 1904.
Cellia, *Pyretophorus*, *Cycloleppteron* and *Anopheles* Lahille, Actas y Trab. 2 Congr. Med. Latino-Amer., ii, 13, 1904.
Cyclolepidopteron, *Stethomyia*, *Cellia*, *Arribalzagia*, *Pyretophorus* and *Myzomyia* Lutz, in Bourroul, Mosquitos do Brasil, 51–52, 1904.
Anopheles Felt, Bull. 79, N. Y. State Mus., 265, 266, 391a, 1904.
Lophoscelomyia Theobald, The Entom., xxxvii, 12, 1904.
Anopheles James & Liston, Monograph of the *Anopheles* mosquitoes of India, Calcutta, 1904.
Anopheles Dyar, Proc. Ent. Soc. Wash., vii, 44, 45, 1905.
Anopheles, *Myzomyia*, *Cycloleppteron*, *Stethomyia*, *Pyretophorus*, *Arribalzagia*, *Myzorhynchus*, *Christya*, *Lophoscelomyia*, *Nyssorhynchus*, *Cellia*, and *Aldrichia* Theobald, Genera Ins., Dipt., 26 fasc., 6–11, 1905.
Anopheles, *Myzomyia*, *Cyclolepidopteron*, *Stethomyia*, *Pyretophorus*, *Myzorhynchus*, *Nyssorhynchus*, and *Cellia* Blanchard, Les Moustiques, 151–152, 159–214, 1905.
Arribalzagaia, *Aldrichia*, *Christya*, and *Lophomyia* Blanchard, Les Moustiques, 624–625, 1905.
Anopheles, *Arribalzagia*, *Cellia*, and *Cycloleppteron* Theobald & Grabham, Mosq. or Culic. of Jamaica, 7, 1905.
Kertesszia Theobald, Ann. Mus. Nat. Hungar., iii, 66, 1905.
Myzomyia, *Anopheles*, *Cycloleppteron* and *Cellia* Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. No. 11, 12, 13, 1906.
Nototricha Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. No. 11, 12, 13, 1906.
Anopheles Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 174, 1906.
Pseudomyzomyia Theobald, Mon. Culic., iv, insert slip, 1907.
Anopheles, *Myzomyia*, *Cycloleppteron*, *Stethomyia*, *Pyretophorus*, *Arribalzagia*, *Myzorhynchus*, *Christya*, *Lophoscelomyia*, *Nyssorhynchus*, *Cellia*, *Aldrichia* and *Kertesszia* Theobald, Mon. Culic., iv, 22–23, 1907.
Myzorhynchella Theobald, Mon. Culic., iv, 23, 78, 1907.
Feltinella Theobald, Mon. Culic., iv, 22, 56, 1907.
Nototricha Theobald, Mon. Culic., iv, 54, 1907.
Lophoscelomyia Theobald, Mon. Culic., iv, 91, 1907.
Neocellia Theobald, Mon. Culic., iv, 23, 111, 1907.
Neocellia Rothwell, The Entomologist, xl, 34, 1907.
Anopheles Dyar & Knab, Can. Ent., xxxix, 48, 1907.
Anopheles Howard, Osler's Modern Medicine, i, 372, 378, 1907.
Manguinhosia Cruz, Um novo gen. braz. da sub-fam. Anophelinae. Trabalho do Inst. de Manguinhos, 1907.
Anopheles and *Nyssorhynchus* Autran, Anal. Dep. Nac. Hig., xiv, 5, 6, 7, 1907.
Anopheles, *Myzomyia*, *Cycloleppteron*, *Feltinella*, *Stethomyia*, *Pyretophorus*, *Myzorhynchella*, *Arribalzagaia*, *Myzorhynchus*, *Christya*, *Lophoscelomyia*, *Manguinhosia*, *Nyssorhynchus*, *Cellia*, *Neocellia*, *Aldrichia*, and *Kerteszia* Peryassú, Os Culicid. do Brazil, 31–33, 1908.
Anopheles, *Lophoscelomyia*, *Myzomyia*, *Myzorhyncus*, *Pyretophorus*, *Nyssorhyncus* and *Cellia* Leicester, Stud. Inst. Med. Res., Fed. Malay Sts., iii, part iii, 18–19, 19–46, 1908.
Anopheles Williston, Man. No. Amer. Dipt., 3 ed., 107, 1908.
Anopheles Dyar & Knab, Can. Ent., xl, 311, 1908.
Anopheles Pazos, San. y Ben. ii, 43, 1909.
Calvertia Ludlow (not Warren), Can. Ent., xli, 22, 1909.

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Calvertina Ludlow, Can. Ent., xli, 284, 1909.
Christophersia James, Paludism, No. 1, 23, 1910.
Nyssomyzomyia James, Paludism, No. 1, 37, 1910.
Neomyzomia Theobald, Mon. Culic., v, 1, 29, 1910.
Aldrichinella Theobald, Mon. Culic., v, 3, 77, 1910.
Aldrichia Theobald, Mon. Culic., v, 77, 1910.
Anopheles, *Myzomyia*, *Cycloleppteron*, *Feltinella*, *Stethomyia*, *Pyretophorus*, *Myzorhynchella*, *Arribalzagia*, *Myzorhynchus*, *Christya*, *Lophoscelomyia*, *Nyssorhynchus*, *Cellia*, *Neocellia*, *Kerteszia*, and *Chagasia* Theobald, Mon. Culic., v, 1–3, 1910.
Neostethopheles James, Rec. Indian Mus., iv, 93, 1910.
Patagiamyia James, Rec. Indian Mus., iv, 98, 1910.
Nyssomyzomyia James, Rec. Indian Mus., iv, 101, 1910.
Christophersia James, Rec. Indian Mus., iv, 103, 1910.
Myzomyia, *Pyretophorus*, *Nyssorhynchus*, *Neocellia*, *Cellia*, and *Myzorhynchus* James, Rec. Indian Mus., iv, 98–105, 1910.
Neomyzomyia James, Rec. Ind. Mus., iv, 109, 1910.
Dactylomyia Newstead & Carter, Ann. Trop. Med. & Paras., iv, 377, 1910.
Anopheles Edwards, Bull. Ent. Res., ii, 141, 1911.
Anopheles Edwards, Bull. Ent. Res., iii, 241, 1912.
Anopheles Brèthes, Bol. Inst. Ent. y Pat. Veg., i, 10, 13, 1912.
Proterorhynchus Brèthes, Bol. Inst. Ent. y Pat. Veg., i, 10, 14, 1912.
Cellia Brèthes, Bol. Inst. Ent. y Pat. Veg., i, 11, 17, 1912.
Arribalzagia, *Myzorhynchus*, *Christya*, *Lophoscelomyia*, *Stethomyia*, *Feltinella*, *Myzomyia*, *Neomyzomyia*, *Cyclolepidopteron*, *Pyretophorus*, *Myzorhynchella*, *Neocellia*, *Aldrichinella*, *Kerteszia*, *Manguinhosia* Surcouf & Gonzalez-Rincones, Arch. Parasitol., xv, 268-270, 1912.
Nyssorhynchus Surcouf & Gonzalez-Rincones, Arch. Parasitol., xv, 270, 1912.
Cellia Surcouf & Gonzalez-Rincones, Arch. Parasitol., xv, 270, 272, 1912.

The type species are:

Of *Anopheles* Meigen, *Anopheles maculipennis* Meigen.
Of *Cycloleppteron* Theobald, *Anopheles grabhamii* Theobald.
Of *Cyclolepidopteron* Blanchard, *Anopheles grabhamii* Theobald.
Of *Grassia* Theobald, *Anopheles rossii* Giles.
Of *Myzomyia* Blanchard, *Anopheles rossii* Giles.
Of *Stethomyia* Theobald, *Stethomyia nimba* Theobald.
Of *Howardia* Theobald, *Anopheles costalis* Loew.
Of *Pyretophorus* Blanchard, *Anopheles costalis* Loew.
Of *Rossia* Theobald, *Anopheles sinensis* Wiedemann.
Of *Myzorhynchus* Blanchard, *Anopheles sinensis* Wiedemann.
Of *Laverania* Theobald, *Anopheles argyritarsis* Robineau-Desvoidy.
Of *Nyssorhynchus* Blanchard, *Anopheles albimanus* Wiedemann.
Of *Cellia* Theobald, *Anopheles pharoensis* Theobald.
Of *Arribalzagia* Theobald, *Arribalzagia maculipes* Theobald.
Of *Aldrichia* Theobald, *Aldrichia error* Theobald.
Of *Christya* Theobald, *Christya implexa* Theobald.
Of *Lophoscelomyia* Theobald, *Lophoscelomyia asiatica* Theobald.
Of *Lophomyia* Giles, *Lophoscelomyia asiatica* Theobald.
Of *Nototricha* Coquillett, *Cycloleppteron mediopunctatus* Theobald.
Of *Feltinella* Theobald, *Feltinella pallidopalpi* Theobald.
Of *Kerteszia* Theobald, *Kerteszia boliviensis* Theobald.
Of *Myzorhynchella* Theobald, *Myzorhynchella nigra* Theobald.
Of *Manguinhosia* Cruz, *Manguinhosia lutzi* Cruz.
Of *Calvertia* Ludlow, *Chagasia* (?) *lineata* Ludlow.
Of *Calvertina* Ludlow, *Chagasia* (?) *lineata* Ludlow.
Of *Neocellia* Rothwell, *Neocellia intermedia* Rothwell.
Of *Neocellia* Theobald, *Neocellia indica* Theobald.
Of *Pseudomyzomyia* Theobald, *Anopheles rossii* Giles.
Of *Neomyzomyia* Theobald, *Anopheles elegans* James.
Of *Aldrichinella* Theobald, *Aldrichia error* Theobald.
Of *Christophersia* James, *Christophersia halli* James.
Of *Nyssomyzomyia* James, *Anopheles rossii* Giles.
Of *Neostethopheles* James, *Anopheles aitkenii* James.
Of *Patagiamyia* James, *Anopheles gigas* Giles.
Of *Dactylomyia* Newstead & Carter, *Dactylomyia ceylonica* Newstead & Carter.
Of *Proterorhynchus* Brèthes, *Proterorhynchus argentinus* Brèthes.

GENERIC DIAGNOSIS OF ADULT:

Proboscis rather long and slender. Palpi long in both sexes, slender and uniform in the female, much enlarged at tip in the male. Antennæ filiform in the female,

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the joints subequal, with basal whorls; plumose in the male, the last two joints long, the others short, with whorls of long dense hairs. Prothoracic lobes remote dorsally, small. Mesonotum elongate, narrow, flattened; scutellum not lobed. Postnotum nude. Abdomen subcylindrical, blunt at the tip in the female, depressed and with lateral ciliation in the male. Scale vestiture of body usually poorly developed and not general. Wings with the second marginal cell long and with short stem. Legs very long and slender; claws simple and equal in the female, the male with the front claws modified, one large and toothed, the other obsolete.

Generic Diagnosis of Larva:

Head elongate, turning easily on the neck. Front prominent, arcuate. Antennæ rather small, sublaterally inserted. Mouth parts adapted essentially for vegetable food; maxillæ large, conical, prominent, with well developed palpi; mouth-brushes moderate, of numerous hairs. Air tube very broad, sessile, the spiracular orifices independent. Abdomen with a series of dorsal tufts of small leaf-like lamellæ for attachment of the body to the surface film of the water, similar tufts are present on the thorax of some species. Eighth segment laterally with narrow plates produced into a row of teeth posteriorly. Hairs of the body mostly well feathered. Anal segment with a chitinized dorsal plate; ventral brush large, strongly feathered; anal gills small.

Throughout tropical and temperate continental regions, a few species extending into the subarctic zone; absent from many of the smaller oceanic islands.

The large generic synonymy which we quote is due to the fact that the genus was subdivided upon characters of the vestiture of the body and wings. We have shown in our introductory remarks that such characters are not reliable for definition of natural genera, and we have had no recourse but to place all the names in the synonymy. One genus was founded upon the so-called mammillate prothoracic lobes, but it has been shown that these are more or less similar in all *Anopheles*, and in no wise peculiar. The fact is that the species here classified under *Anopheles* are all closely allied and strictly congeneric, and any attempt to divide them generically will serve no useful purpose, but on the contrary only tend to confuse the subject. In any case the genus is homogeneous and not a large or unwieldy one; it is therefore far more convenient as well as logical to treat the genus as one.

The eggs are laid singly on the surface of water and float. They are fusiform with rounded ends, and furnished with longitudinal leaf-like appendages to cause them to float. These appendages are very different in shape and even in size in the different species. The larvæ are surface feeders, being held to the surface film by their fan-shaped abdominal tufts and very short air-tube. The head is turned completely over with the mouth uppermost in the act of feeding. The different species have somewhat different habits as to the choice of kinds of water in which to breed, but many of the species breed in almost all sorts of water, even in the edges of rapidly flowing streams. A few species are restricted to water held by the leaves of Bromeliaceæ. Some species occur in brackish as well as fresh water, and even appear to thrive better in the former. The larvæ of some species occur in sea-water, often in pools of very high saline content. The larvæ of *Anopheles* generally occur in water containing algæ, upon which they feed; but James and Liston state that they cannot subsist upon a vegetable diet alone but feed also upon minute water animals. Some of the species are in part at least predaceous upon other mosquito larvæ. In temperate and northern regions hibernation, with some exceptions, is in the adult state. James and Liston are of the opinion that in India the species of *Anopheles* do not hibernate as adults, but either hibernate as larvæ (*A. culicifacies*) or have no true hibernation and manage to breed throughout the season (*A. fuliginosus, A. pulcherrimus*). Species unable to adopt these methods (*A. rossi*) are thought to "migrate" or disappear during the winter. The species of temperate North America of which the habits are known (*A. crucians, A. quadrimaculatus, A. punctipennis*) hibernate as adults. In central Europe one species hibernates regularly as larva. The adults are generally crepuscular in habit, flying immediately before dark. Apparently the females of all the species feed more or less readily on the blood of vertebrates, the craving for blood being, however,

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keener in some species than in others. Those species with the strongest appetite for blood will fly considerable distances from their breeding-places, if necessary, to obtain blood. The males congregate in swarms, to which females fly singly for sexual union.

Tables of the Species.

Adults, structure, and coloration.

1. Tarsi ornamented with white or yellow 2
   Tarsi wholly dark colored 13
2. Hind tarsi with a series of rings 5
   Hind tarsi all white beyond second joint 3
   Hind tarsi white beyond second joint, a black spot on the last joint 4
3. Abdomen dorsally covered with scales. *argyritarsis* Robineau-Desvoidy (p. 967)
   Abdomen clothed dorsally with hairs only ..... *lutzii* Cruz (p. 971)
4. Palpi with the last two joints white except narrowly at bases *tarsimaculata* Goeldi (p. 975)
   Palpi with the last joint only white ..... *albimanus* Wiedemann (p. 979)
5. Hind tarsi with small basal rings only; palpi wholly black scaled *grabhamii* Theobald (p. 1006)
   Tarsi more conspicuously ornamented; palpi not wholly black scaled 6
6. Tarsi and tibiæ narrowly ringed and speckled black and white or yellow 8
   Hind tarsi with broad apical segmental white rings, not speckled 7
7. Wings with four white spots on the costa ..... *bellator* Dyar & Knab (p. 985)
   Wings with two white spots on the costa, five on the first vein *neivai* Howard, Dyar & Knab (p. 986)
8. Wing-scales mostly blackish, many little patches of yellow ones *vestitipennis* Dyar & Knab (p. 989)
   Wing-scales black and white or yellow, several large concrete patches of black scales 9
9. Hind tarsal joints with apical rings, the last joint wholly black *maculipes* Theobald (p. 990)
   Hind tarsi with rings involving both ends of the joints, last joint mostly or wholly pale scaled 10
10. Wing-scales broad and rounded 11
    Wing-scales narrowly ovate to lanceolate 12
11. Tarsi yellow with small black dots ..... *mediopunctatus* Theobald (p. 993)
    Tarsi black with white rings ..... *malefactor* Dyar & Knab (p. 1000)
12. Hind tarsi with numerous yellow rings ..... *strigimacula* Dyar & Knab (p. 998)
    Hind tarsi with sparse white rings ..... *apicimacula* Dyar & Knab (p. 995)
13. Hind tibiæ broadly white at apex ..... *eiseni* Coquillett (p. 1002)
    Hind tibiæ without white apical ring 14
14. Wings with a white spot at outer third of costa 15
    Wings without such spot on the costa 16
15. Palpi marked with white; third vein extensively white in the middle *pseudopunctipennis* Theobald (p. 1014)
    Palpi wholly black scaled; third vein wholly black scaled *punctipennis* Say (p. 1009)
16. Wings with patches of yellowish scales, sixth vein with three black spots *crucians* Wiedemann (p. 1023)
    Wings without patches of pale scales 17
17. Wing at apex with a coppery spot on the fringe *occidentalis* Dyar & Knab (p. 1026)
    Wing-fringe uniformly dark throughout 18
18. Body blackish throughout, hair-scales of mesonotum dark brown *atropos* Dyar & Knab (p. 1032)
    Body not wholly blackish, hair-scales of mesonotum yellow or white 19
19. Palpi of the female with dull silvery white rings at the bases of the joints; scales of wings not distinctly massed at bases of fork-cells *walkeri* Theobald (p. 1033)
    Palpi of the female blackish scaled throughout; scales of wings massed to form distinct spots at the cross-veins and at bases of fork-cells *quadrimaculatus* Say (p. 1028)

Larvæ.

1. Comb of the eighth segment with the teeth all long, equal *neivai* Howard, Dyar & Knab (p. 987)
   Teeth of the comb alternatingly long and short { *malefactor* Dyar & Knab (p. 1002) / *strigimacula* Dyar & Knab (p. 999) }
   Teeth of the comb both long and short, irregular 2

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2. Abdomen with seven pairs of dorsal fan-shaped tufts, the pair on first segment small ..... { *albimanus* Wiedemann (p. 982) / *tarsimaculata* Goeldi (p. 977)

Abdomen with six pairs of fan-shaped tufts 3
Abdomen with five pairs of well-developed tufts 5

3. Elements of the fan-shaped tufts slender, smoothly pointed *argyritarsis* Robineau-Desvoidy (p. 969)

Elements of the fan-shaped tufts notched towards tip 4

4. Fan-shaped tufts all equal in size ..... *eiseni* Coquillett (p. 1005)

First pair of tufts small ..... { *punctipennis* Say (p. 1012) / *quadrimaculatus* Say (p. 1030)

5. First and last pair of fan-shaped tufts smaller than the others *crucians* Wiedemann (p. 1025)

Fan-shaped tufts all equal 6

6. Elements of fan-shaped tufts with long slender apical portion *pseudopunctipennis* Theobald (p. 1021)

Fan-shaped tufts with normal elements ... { *occidentalis* Dyar & Knab (p. 1027) / *grabhamii* Theobald (p. 1008)

The following are omitted, as we possess no larvæ:

atropos D. & K. — *mediopunctatus* Theob. — *vestitipennis* D. & K.
bellator D. & K. — *lutzii* Cruz. — *walkeri* Theob.
maculipes Theob.

ANOPHELES ARGYRITARSIS Robineau-Desvoidy.

Anopheles argyritarsis Robineau-Desvoidy, Mém. Soc. d'Hist. Nat., iii, 411, 1827.
Anopheles argyrotarsis Giles, Handb. Gnats or Mosq., 154, 1900.
Anopheles argyrotarsis Theobald, Mon. Culic., i, 123, 1901.
Anopheles argyritarsis Neveu-Lemaire, Arch. Parasitol., vi, 6, 1902.
Anopheles albimanus Neveu-Lemaire (not Wiedemann), Arch. Parasitol., vi, 613, 1902.
Anopheles argyrotarsis Giles, Handb. Gnats or Mosq., 2 ed., 295, 1902.
Laverania argyrotarsis Theobald, Journ. Trop. Med., v, 183, 1902.
Cellia argyrotarsis Theobald, Mon. Culic., iii, 110, 1903.
Laverania argyrotarsis Fajardo, Brazil Medico, xvii, 12, 1903.
Cellia argyrotarsis Giles, Rev. Anophel., 45, 1904.
Cellia argyrotarsis Bourroul, Mosq. do Brasil, 63, 1904.
Nyssorhynchus albimanus Blanchard (in part, not Wiedemann), Les Moustiques, 202, 1905.
Cellia argyrotarsis Theobald (in part), Gen. Ins., Dipt., 26 fasc., 11, 1905.
Cellia argyrotarsis Theobald, Mosq. or Culic. of Jamaica, 9, 14, 1905.
Cellia (Anopheles) argyrotarsis Goeldi, Os Mosq. no Para, 129, 1905.
Anopheles argyrotarsis Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 176, 1906.
Cellia argyritarsis Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 13, 1906.
Cellia argyrotarsis Theobald, Mon. Culic., iv, 105, 1907.
Anopheles argyritarsis Howard, Osler's Modern Medicine, i, 383, 386, 1907.
Cellia albitarsis Aiken (not Arribálzaga), Brit. Guian. Med. Ann., 1906, 66, 1907.
Nyssorhynchus albimanus Autran (not Wiedemann), Anal. Dep. Nac. Hig., xiv, 8, 1907.
Anopheles argyritarsis Busck, Smiths. Misc. Colls., quart. iss., iii, 59, 1908.
Cellia argyrotarsis Peryassú, Os Culicid. do Brazil, 41, 116, 1908.
Cellia argyrotarsis Neiva, Mem. Inst. O. Cruz, i, 69, 1909.
Cellia argyrotarsis Prout, Ann. Trop. Med. & Paras., iii, 487, 1909.
Cellia argyrotarsis Theobald, Mon. Culic., v, 68, 1910.
Cellia argyrotarsis Newstead & Thomas, Ann. Trop. Med. & Par., iv, 141, 1910.
Anopheles argyritarsis Darling, Stud. Rel. Malaria, Isthm. Canal Comm., 5, 1910.
Anopheles argyrotarsis Nicholls, Bull. Ent. Res., iii, 252, 1912.
Anopheles argyritarsis Jennings, Journ. Econ. Ent., v, 133, 1912.
Nyssorhynchus albimanus Surcouf & Gonzalez-Rincones (not Wiedemann), Arch. Parasitol., xv, 271, 1912.
Cellia argyrotarsis Surcouf & Gonzalez-Rincones, Arch. Parasitol., xv, 273, 1912.

ORIGINAL DESCRIPTION OF ANOPHELES ARGYRITARSIS:

Proboscis nigra. Corpus nigricans. Abdomen immaculatum. Pedes graciles, pallidè fusci, tarsis posterioribus apice albo-argyreis.

Long. 2½ lineas.

♀. Proboscis nigra: palpi fusci. Thorax et abdomen nigra aut nigricantia, abdomine immaculato. Pedes graciles, elongati, bruneo-pallidi; tarsorum posteriorum ultimis articulis albo-argyreis. Alae, nervis villosis maculatis, costâ fusco-maculatâ.

Habitat in Brasiliâ. (Musaeum Parisiense.)

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DESCRIPTION OF FEMALE, MALE, AND LARVA OF ANOPHELES ARGYRITARSIS:

Female.—Proboscis moderate, slightly thicker towards base, straight; vestiture black; labellæ long, lanceolate, dark, with a few outstanding setæ. Palpi as long as the proboscis, uniform, roughly clothed with long spatulate scales, roughest on basal third, black, last joint silvery white and narrow white rings at the two preceding articulations. Antennæ filiform; joints short, subequal, blackish, densely whitish pilose; second joint much longer than succeeding one, slightly thickened, with some lanceolate white scales; hairs of whorls short, sparse, black with white luster; tori small, subspherical, with an apical cup-shaped excavation, piceous with grayish pruinosity and a few broad white scales. Clypeus prominent, subtriangular, blackish, nude. Eyes well separated at vertex, black. Occiput dark, clothed with semi-erect elliptical and broad forked white scales on the vertex, broad black ones on the sides, a group of long white hair-like scales projecting forward on the vertex; a row of dark setæ along margins of eyes.

Prothoracic lobes small, lateral. Mesonotum elongate, narrow, flattened, dark gray; vestiture of rather sparse, small lanceolate, curved white scales and with rows of short black bristles; two narrow, longitudinal, submedian bare lines on anterior half and two broader bare lines sublaterally on posterior two-thirds; three velvet-black spots, one before scutellum, the other two at anterior ends of the sublateral posterior stripes. Scutellum collar-like, uniform, dark gray, with a marginal row of black bristles and clothed with small white scales like those of the mesonotum. Postnotum elliptical, prominent, blackish, nude. Pleuræ and coxæ blackish brown, pruinose, with rows of black bristles, and with small groups of silvery-white scales along the sutures and on the coxæ.

Abdomen subcylindrical, flattened, subtruncate at tip, blackish, densely clothed with scales; dorsal vestiture of dull yellowish-white scales, with large ill-defined patches of blackish-brown roughened scales at apical angles of segments; eighth segment with a broad apical band of dark scales; numerous coarse dark bristles, particularly at sides; venter with a few white scales in the middle, some black ones on the last segment.

Wings (plate 41, fig. 19) moderate, hyaline; petiole of second marginal cell about one-third as long as its cell, that of second posterior cell longer than its cell; basal cross-vein distant more than its own length from the anterior cross-vein; scales of the veins black and white, the outstanding ones lanceolate, the black in patches as follows: six spots on costal margin, first and second small, on basal fifth, third, fourth and fifth large, separated by small white spots, apical spot small; first vein with first black spots, the first small and opposite base of third costal spot, the third, fourth and fifth opposite the fourth, fifth and sixth costal spots and nearly as large; second vein with the stem mostly black-scaled, upper fork with a long black patch near base and a short one near apex, lower fork with two short black patches; third vein with small black spots at base and near apex; fourth vein with a black patch at base of fork, two spots on upper branch, one near apex of lower; fifth vein with a black patch before fork, upper branch with three small black patches, lower one with a large terminal one; sixth vein with a black patch near base and another near apex; fringe dark, marked with white at terminations of all the veins. Halteres whitish, with dark knobs.

Legs long and slender; femora clothed mostly with black scales on outer side and with white ones on inner side, a small black ring just beyond base, middle femora with two white spots on outer side just before apex, hind femora with one white spot similarly situated; knees white; tibiæ black, a white line on inner side; tarsi black and white; front tarsi with white apical rings on first, second, and third joints; mid tarsi unmarked; hind tarsi with apical two-thirds of second joint and all of third, fourth, and fifth joints white. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 4 mm.

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Male.—Palpi as long as proboscis, the last two joints thickened into a distinct club and bearing long black hairs; club dorsally white scaled, with a black median ring and black at base; a white ring at middle of long joint. Antennæ densely plumose; last two joints long and slender, rugose, pilose, black, the others short, white, with black expanded basal rings bearing long, dense, silky-brown hairs; tori small. Coloration as in the female. Abdomen elongate, slender, depressed, somewhat expanded towards apex. Wings narrower than in the female; stems of fork-cells longer; vestiture somewhat sparser. Claw formula, 2–0.0–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Genitalia (plate 38, fig. 258): Side-pieces over twice as long as wide, tips rounded; clasp-filament long and slender, broadly thickened at base and toward apex, terminally with a short and spatulate articulated spine that arises a little to one side of the pointed apex; two long approximated spines with recurved tips below middle of side-piece, a similar smaller pair at base and a single stouter one toward the outer aspect; false harpes small, flattened, revolute; unci forming a stout process with small apical notch.

Larva, Stage IV.—Head elongate, rounded, bulging at the sides, antennæ laterally inserted, portion before antennæ conically produced; both pairs of dorsal head-hairs single but numerously branched, in a line between antennæ, a smaller hair at base of antennæ; two long approximate spines on clypeus. Antennæ moderate, subcylindrical, slightly tapering outwardly, coarsely spined on inner side; a small dendritic tuft at basal third; two long terminal spines, a slender tuft exceeding the spines and a small digit. Mental plate small, with a central tooth and four on each side; first and second nearly equal, third remote, fourth small. Mandible rounded quadrangular; a row of filaments at base becoming smaller outwardly; four filaments before tip, two smooth, two serrately notched; an outer row of cilia; eight serrate filaments on outer margin; dentition of two small teeth, a large notched one on lower declivity, followed by two small teeth and a long row of confluent spines; two serrate filaments within; basal angle slender, rounded; a row of long hairs at base. Maxilla transversely quadrangular, serrate along outer margin; hairs short, longer at inner angle, below which are two small filaments; palpus moderate, tapered outwardly, a large dendritic tuft, a group of digits and flattened appendages at tip. Thorax subquadrate, about as wide as long; hairs short, stout, amply feathered, also some branched hairs, single hairs and tufts. Abdomen stout, anterior segments shorter; lateral hairs on first three segments long, feathered, double on first and second, single on third; hairs on succeeding segments small, smooth; a dorsal series of six pairs of fan-shaped tufts on the second to seventh segments (plate 130, fig. 459). Air-tube sessile, subquadrate, roundedly angled posteriorly. Lateral plates of eighth segment posteriorly with a series of spines, five or six very long ones separated from each other by two or three short irregular intervening ones. Anal segment about as long as wide, with a small dorsal plate; dorsal brush a long branched hair and a short tuft on each side; a single long lateral hair below the plate; ventral brush well developed, of long branched tufts; anal gills moderate, about as long as anal segment, tapered, blunt.

The larvæ live in all sorts of ground-pools. Mr. Busck found them in rain water in an old dump car, in a shaded pool and in a swampy pasture, Mr. Knab found them in pools in a stream-bed; Mr. Jennings found them in a spring, a stream, the edges of a reservoir, and in water-filled hoof-prints in a road. Goeldi states that the adults are nocturnal but Neiva states that they are crepuscular. Jennings, who made extended observations in the Panama region, discusses the species as follows:

"It is widely distributed over the Isthmus but its numbers are never very great in any locality and it is not very frequently found in buildings. By reason of these facts, it is far less important economically than *Anopheles albimanus* and *tarsimaculata*. It is the only species of Isthmian Anopheles which breeds

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readily in artificial containers. In ground water it prefers the smaller collections, such as water seeping from springy hillsides and filling the smaller depressions in soft ground, also ditches carrying but a trickle of water and similar situations. It seems quite dependent upon the presence of algæ."

Tropical American mainland; Lesser Antilles.

Córdoba, Mexico, January 6, 16, February 5, March 4, April 5, 1908 (F. Knab); Rincon Antonio, Mexico, June 24, 1905 (F. Knab); Las Cascadas, Canal Zone, Panama (A. Busck); Empire, Canal Zone, Panama (A. H. Jennings); Ancon, Canal Zone, Panama, December 2, 1907 (A. H. Jennings); Corozal, Canal Zone, Panama, November 30, 1907 (A. H. Jennings); East La Boca, Canal Zone, Panama, December 6, 1907 (A. H. Jennings); Rio Grande Reservoir, Canal Zone, Panama, December 14, 1907 (A. H. Jennings); Road to Comacho dam, Canal Zone, Panama, December 20, 1907 (A. H. Jennings); Empire, Canal Zone, Panama, December 20, 1907 (A. H. Jennings); San Pablo, Canal Zone, Panama, December 24, 1907 (A. H. Jennings); New Amsterdam, British Guiana, May, 1907 (J. Aiken); Fort de France, Martinique, July 20, 1905 (A. Busck); São Paulo, Brazil (A. Lutz). Reported also from Antigua, Dominica, St. Vincent, Grenada, Trinidad (Theobald); St. Lucia (Theobald, Nicholls); Manáos and Teffé, State of Amazonas, States of Pará, Matto Grosso, Minas Geraes, Bahia, Alagôas and Rio de Janeiro, Brazil (Peryassú); Argentina (Theobald, Autran).

Theobald records this species from Jamaica, on the strength of specimens taken by Dr. Grabham in 1899 and "not met with since." We suspect that there is something wrong with this record. The species inhabits the South American faunal region of which the Lesser Antilles are part, but does not, in our experience extend its range into the Greater Antilles, which comprise an essentially different faunal region. We should not, therefore, expect to find it in Jamaica, and accordingly omit the locality pending confirmation. The later records, by Theobald, of this species from Cuba, Haiti and Porto Rico are open to the same objection. In fairly abundant material from these islands we have never encountered a specimen of *Anopheles argyritarsis*. We suspect that the records are merely due to the confusion of this species with *A. albimanus* and that they are in reality referable to the latter species. It should be further noted that specimens of *A. albimanus* with the hind tarsals broken may be easily mistaken for *argyritarsis*. Such specimens may be recognized by the pale ocher-yellow color of the light scales on the wings, these scales usually being pure white in *argyritarsis*.

Much confusion has arisen in the literature owing to the fact that *Anopheles albimanus* has been treated as a variety of *A. argyritarsis*, under the name variety *albipes* Theobald. The two are distinct in all their stages and often occur quite independently.

Anopheles argyritarsis has been reported by Howard from New Orleans, Louisiana, but we believe that this record is either based upon an accidentally introduced specimen or more likely upon a misidentification. The records from the Argentine are open to question and are probably based upon misidentifications of the closely similar *Anopheles albitarsis* Lynch Arribálzaga.

Our specimens show considerable variation in the development of the scale-tufts at the apical angles of the abdominal segments and a tendency toward the formation of local races appears to be indicated. A specimen from British Guiana shows very well developed tufts of strongly outstanding, broadly ovate scales, well differentiated from the scales of the dorsum. A series of specimens from Panama shows incomplete tufts, the scales less differentiated from the dorsal ones and gradually becoming more erect toward the apical angles of the segments. A specimen sent by Doctor Lutz from São Paulo, Brazil, agrees with this form in the abdominal tufting. Finally, a series reared by Knab in southern Mexico shows no trace of tuftings. All these specimens agree very closely in

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all other details, so we are forced to consider them as one species. This variation should be instructive for those who adhere to the numerous genera based upon such characters; these scale-tufts have been considered diagnostic of the genus *Cellia,* to which *argyritarsis* has been referred, and it now appears that they are not even of specific value.

ANOPHELES LUTZII Cruz.

Anopheles lutzii Cruz, Brazil-Medico, xv, 423, 1901.
Pyrethophorus lutzii Bourroul, Mosq. do Brasil, 19, 1904.
Pyretophorus lutzii Lutz in Bourroul, Mosq. do Brasil, 36, 63, 1904.
Myzorhynchella nigra Theobald, Monogr. Culic., iv, 78, 1907.
Pyretophorus lutzii Theobald, Mon. Culicid., iv, 80, 1907.
Myzorhynchella lutzi Chagas, Nov. Esp. de Culic. Brazileiros, Trabalho do Inst. Manguinhos, 4, 1907.
Myzorhynchella lutzi Peryassú, Os Culicideos do Brazil, 89, 1908.
Myzorhynchella lutzi Neiva, Mem. Inst. Oswaldo Cruz, 1, 75, 1909.
Myzorhynchella nigra Theobald, Mon. Culic., v, 45, 1910.
Myzorhynchella lutzi Theobald, Mon. Culic., v, 46, 1910.
Anopheles albitarsis Knab (in part, not Lynch Arribálzaga), Amer. Journ. Trop. Dis. & Prev. Med., 1, 35, 1913.

ORIGINAL DESCRIPTION OF ANOPHELES LUTZII (CRUZ):

Côr geral do mosquito: escuro quasi preto. Comprimento, não incluindo a *proboscida:* 4 a 6 millimetros.

Azas—Comprimento: 4 a 5 m/m, segundo o desenvolvimento do insecto. Côr geral da aza amarello-louro. Sobre a nervura costal notam-se 3 manchas pretas principaes, além de mais quatro secondarias, das quaes tres punctiformes. Das 3 grandes manchas uma occupa a extremidade livre da aza. A essa denominaremos mancha n. 1.

As outras duas assestam-se sobre a nervura costal propriamente dita, extendendo-se para baixo até á primeira nervura longitudinal. Denominaremos essas manchas de ns. 2 e 3. Além dessas, temos a considerar um pequeno ponto mais pigmentado e situado sobre a 5ª nervura longitudinal.

As manchas são constituidas por um accumulo de escamas pretas e de pigmento preto. As escamas e a pigmentação não concorrem com igual contingente para a formação de todas as manchas. Assim, a mancha da extremidade livre da aza (n. 1) é constituida quasi que exclusivamente por escamas, e é por isso que póde desapparecer nos exemplares muito manipulados, ao passo que a mancha n. 3 deve sua côr, sobretudo, ao pigmento, como se poderá ver pela inspecção da figura n. 2, que, como a de n. 1, devemos á pericia do pericia do nosso distincto collega e amigo DR. ROCHA LIMA. Essa figura representa a mancha n. 3 vista sob um maior augmento. Todas as nervuras são cobertas de escamas de côr castanho-claro alouradas. A parte interna da *vena marginalis* é ornada por uma franja constituida por escamas de diversos tamanhos, que se acham em contacto pelas faces planas.

Abdomen—A côr dominante do abdomen é preta, sobretudo nos exemplares seccos. Examinado-se, porém, attentamente este segmento do insecto, sobretudo quando distendido pelo sangue, verifica-se que, nas membranas lateraes que ligam os arcos tergaes aos esternaes, existe um caprichoso desenho, muito visivel quando se observa sob uma certa incidencia da luz. Esses desenhos são de côr castanho-escuro, quasi preto, sobre um fundo castanho muito claro. Como se poderá bem ajuizar pelo exame da fig. schematica n. 3, o desenho é constituido por duas séries principaes de manchas cylindro conicas, entre as quaes notam-se outras cuneiformes, além de algumas menores de formas variadas e inconstantes. Essas manchas, que são muito visiveis nos segmentos médianos, não apresentam rigorosamente a mesma conformação em todos os segmentos, desapparecendo quasi por completo nos ultimos e primeiros aneis abdominaes. A porção dorsal do abdomen apresenta a côr castanho-claro quasi louro, notando-se uma orla preta na porção disal dos segmentos. Sobre o 3° e 4° segmentos notam-se pequenas manchas pretas. O abdomen é coberto de pellos. O ultimo segmento termina-se por dous appendices em fórma de massa: os *ovipositors.* Comprimento do abdomen, cerca de quatro millimetros.

Thorax—Côr geral castanho-claro. O *notum* apresenta a fórma de uma ventarola chineza, cujo cabo acha-se voltado para a parté anterior do corpo. Essa placa, de consistencia dura, apresenta a côr amarella e mostra no limite posterior, entre as inserções das azas, uma mancha preta triangular, de base posterior e do apice da qual parte uma faixa escura, que prolonga-se até ao pescoço, ao longo da parte estreitada do *notum.* Essa faixa é ladeada por algumas estrias escuras. Ainda na parte larga do *notum,* marcando os pontos em que elle se afunila, para formar a parte anterior estreita, nota-se de cado lado um mancha irregularmente triangular, de base posterior e interna, marcando os angulos de um triangulo isoceles, cujo apice seria representado pela grande mancha posterior, já descripta. Essa peça

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dorsal do thorax é encurvada em tres direcçãoes differentes: Transversalmente e para baixo, de modo a formar um angulo diedro, cuja aresta seria representada pela linha virtual que ligasse as duas manchas anteriores. Lateralmente, de cada lado, e ainda para baixo, em direcção aos lados isoceles do triangulo formado pelas manchas. O *notum*, posteriormente, excede as outras pares sotopostas do thorax. Na parte anterior elle continua-se com as pleuras, por intermedio de uma porção membranosa, disposta em plano inclinado. As *pleuras* apresentam-se constituidas por placas pretas, orladas de branco: destas, a situada mais para traz é muito caracteristica, occupando toda a altura da parede. Acima desta placa encontram-se as inserções dos *balancins*, que apresentram uma côr amarellada. A porção esternal do thorax acha-se disposta de modo a fornecer articulação aos tres pares de pernas do mosquito. Comprimento do thorax: 1.5 m/m, a 2 m m.

Pernas—Pernas anteriores:—Comprimento: 8 m/m. Côr, castanho-claro. Ao longo da borda inferior dos segmentos tarsicos, notam-se escamas e pellos de côr preta. Ligeiro accumulo de escamas pretas nos ultimos segmentos tarsicos, que se terminam por uma garra bi-dentada. Femur fusiforme. *Pernas medias*:—Comprimento 8,5 m/m. Côr geral, castanho-claro. Escamas pretas e castanhas esparsas por todos os segmentos do membro. Nos tarsos, ha alguns pequenos accumulos de escamas pretas, que imprimem ligeiras modalidades na coloração geral do membro, que se termina por uma garra munida de dous dentes. Femur cylindrico, com algumas manchas irregulares pretas. *Pernas posteriores*:—São estas as mais importantes e que apresentam caracteres, que mais impressionam o observador. Comprimento: 11 m/m. Côr geral, castanho-claro. Escamas pretas. Pellos amarellos, que se agglomeram sobretudo junto das articulações. Dilatação conica do tibia junto á articulação tibio-tarsica. A base do cone tibial é munida de pellos, que circundam o primeiro segmento do tarso, que apresenta-se com o côr amarella geral e é coberto de numerosas escamas pretas, terminando por um pequeno annel branco. O segundo segmento do tarso apresenta junto á primeira articulação tarso-tarsica um annel de côr preta, constituido por escamas e pigmento. Todo o segmento apresenta uma côr branca de neve, devida ao accumulo de escamas e pellos prateados. Egual coloração apresenta o terceiro segmento tarsico. O quarto tem, desde a articulação superior até á parte média, uma orla preta em fórma de annel. A metade inferior deste, assim como o quinto segmento, apresenta uma coloração branca amarellada e termina por uma garra provida de dous dentes de cor castanho escuro.

Cabeça—A cabeça do insecto é de côr preta e apresenta as seguintes dimensões: diam. ant.-post. o,8 m/m; diam. transv. o,4 m/m. Os appendices da cabeça apresentam os caracteres do genero e têm as seguintes particularidades:

Antennas—São munidas de numerosos pellos curtos de côr branca. Nas articulações dos segmentos constitutivos do orgam existem verticilios compostos de cerca de 6 a 8 longos pellos. Côr do fundo, castanho claro. Macroscopicamente a côr das antennas é brancacenta, devido ao accumulo dos pequenos pellos referidos, havendo listas escuras nas articulações. Comprimento m/m.

Palpas maxillares—Escuras na base e brancacentas nas porçãoes correspondentes ao ultimo e á parte inferior do penultimo segmento. Essa coloração é devida á falta do pigmento normal do appendice. As *palpas* são cobertas de escamas pretas, que são observadas mesmo nas porçãoes brancas. Notam-se tambem pellos. Terminam-se por uma ponta achatada. Comprimento: 2,5 m/m.

Proboscida—De côr preta, excepto na porção correspondente ás *palpas* labiaes, que são lanceoladas e onde existe uma pequena porção amarellada. A *proboscida* é coberta de pellos e escamas pretas. Comprimento 2,8 m/m.

Tendo recolhido alguns exemplares do sexo feminino da especie que estudámos, procurámos obter uma cultura artificial, paro o que collocámos os mosquitos em um vasto vaso de vidro coberto por uma tela de arame. No interior dessa gaiola foi collocado um crystallisador contendo um pouco de agua pura e algas verdes. No fim de alguns dias fôram depositados ovos, cuja descripção passamos a fazer: Macroscopicamente, as ovos formam na superficie da agua uma massa constituida pelo accumulo irregular dos mesmos, que são vistos como pequenos grãos escuros com reflexos prateados. Ao microscopio, o aspecto varia, segundo são observados pela parte superior, como estão dispostos sobre a agua, ou são vistos de perfil.

São constituidos por duas porções distinctas: O ovo propriamente dito e o apparelho fluctuador e suspensor. O conjuncto desse systema apresenta as seguintes dimensões: comprimento 0 mm, 5517; largura: 0 mm, 2344; altura: 0 mm, 1310. O ovo propriamente dito é de côr castanho escuro e affecta a fórma de um charuto recurvado, apresentando uma extremidade fina e outra em fórma de clava. Suas dimensões são de 0 mm, 5517 de comprimento e de 0 mm, 1517 de diametro em sua porção mais larga. O ovo assim constituido acha-se disposto, com sua parte concava para cima, sendo mantido nessa posição por um apparelho de suspensão e fluctuação.

O apparelho de suspensão, que só póde ser observado quando se encara o conjuncto de perfil, é formado por uma rêde de malhas estreitas que se adapta perfeitamente ao ovo, revestindo toda sua parte convexa até a parte média das porçãoes lateraes, onde elle se continúa com o apparelho de fluctuação, que é constituido do

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seguinte modo: Inserindo-se symetricamente ao longo de duas linhas lateraes oppostas, partem, decrescendo em tamanho para as extremidades do ovo, numerosos arcos chitinosos, que, após recurvamento, convergem para uma linha que acompanha a parte superior ou convexa do ovo. Esses arcos, que, recurvando-se, circumscrevem um espaço, cobrem toda a superficie não revestida pela rêde de suspensão, excepto uma pequena porção da extremidade mais dilatada, que fica emergindo d'um orificio, á circumferencia do qual vêm ter os arcos chitinosos mais afastados.

Todos estes acham-se ligados entre si por uma membrana transparente, que fecha completamente os espaços a que nos referimos, que, cheios de ar, representam o papel de boias, e que, ligeiramente encurvados para cima, fórmam como que uma canôa, em cujo fundo se vê o ovo, que mergulha na agua por sua parte inferior convexa, tendo ao ar as extremidades, das quaes a maior acha-se inteiramente desprotegida. A dehiscencia do ovo se dá segundo uma linha obliqua, situada ao nivel da curvatura immersada da grande extremidade e cuja ruptura interessa a rêde de suspensão.

As larvas no fim de tres dias têm o comprimento de 1 mm, 5. Apresentam os caractéres geraes peculiares ao genero, notando-se a intensa pigmentação da porção média dos segmentos abdominaes.

No que se refere ao modo de vida da especie que acabamos de estudar, em nada parece differir do que ha estabelecido para os «*Anopheles.*» Apparecem ao crepusculo, procurando os lugares abrigados do vento. São encontrados em grande profusão nos estabulos. Durante o dia procuram os locaes escuros e humidos; nos domicilios, os recantos sombrios sob as cortinas, mesas e camas, atacando os individuos sómente á noite. Quando em captiveiro custam muito a picar. A picada é bastante dolorosa. Parece, terem predilecção por certos individuos, o que tivemos occasião de verificar nas excursões que fizémos para colheita de exemplares. Pousam, formando um angulo de mais de 45°, e quando pousados executam com as patas posteriores amplos movimentos de circumducção.

Cotejando a especie que acabamos de descrever com as consignadas na systematica encontrada no livro, já citado, de Giles «*A Handbook of the Gnats or Mosquitoes*, London, 1900.» vemos que ella aprèsenta certas affinidades com as seguintes especies: «*An. albimanus, Wied.*», do qual se distingue, sobretudo, pelo facto de ter sómente os segmentos tarsicos do ultimo par de pernas brancos, emquanto o "*albimanus*" apresenta essa côr em todas as partes.

«*An. albitarsis, Arribalzaga*», com o qual á primeira vista confunde-se. Distingue-se, porém, d'essa especie pela ausencia da coloração branca das 4 primeiras articulaçoes tarsicas, assim como da côr branca do ultimo d'esses segmentos, nos pares de patas anterior e médio. Além d'isso, o abdomen do "*albitarsis*" é descripto como não apresentando desenhos: "Abdomen not stated to be at all adorned."

"*An. argyrotarsis, Desv.*, do qual se distingue pelas manchas do abdomen, que não existem no "*argyrotarsis*": "abdomen unadorned, black," "abdomen unspotted." Alem d'isso a tonalidade da coloração branca dos segmentos tarsicos do par posterior de patas é differente: branco de neve na especie que descrevemos, branco argiloso (clay-white) no *argyrotarsis*.

Não temos a pretensão de affirmar que a especie que acima foi descripta seja nova. Julgamos, ao contrario, que se trata d'um variedade de algumas das especies similares acima referidas. Em todo caso, antes que os doutos se pronunciem, proporia que se designasse provisoriamente o mosquito, que corresponde á descripção dada, sob o nome de «*Anopheles Lutzii*», em homenagem ao sabio que com tanta proficiencia dirige o Instituto Bacteriologico de S. Paulo.

ORIGINAL DESCRIPTION OF MYZORHYNCHELLA NIGRA:

♀. Head black with a median bare line, flat grey scales on each side with a dull blue shade, flat rather outstanding, black ones on each side of the pale median area, becoming more upright at the back, and with some small outstanding narrow white ones in front, a few narrow-curved creamy scales between the eyes in front, and a tuft of long pale hairs projecting forwards. Antennae black with a few scales on the basal segments, and pale pubescence to the internodes; palpi black scaled with four narrow white bands, the two apical ones close together, the third closer to the second than the third is to the fourth; proboscis thin, black.

Thorax black with creamy-white spindle-shaped scales and dark chaetae, a tuft of longer pale scales on each side in front; scutellum with similar scales to mesonotum but narrower; metanotum black.

Abdomen black with dull golden hairs, no scales.

Legs with the femora, tibiae and to some extent the first tarsals with brown and pale scales; first tarsals and two following tarsals of fore legs with pronounced apical white bands; in the mid legs the femora are darker and have a pure white spot near the apex and the apical bands are much narrower; in the hind legs the femora have the white spot near the apex, are all dark as also the tibiae, the last three tarsals snowy white, also half the second and apex of the first; femora and tibiae of all the legs white beneath; apex of all the tibiae also white.

Wings dusky, scaled with dark scales and a few yellow patches; three small

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prominent yellow spots on the costa and two small ones basally, the last at root of wing; first the largest and extends on to the first long vein, the second is the next largest and also extends on the first long vein, the third only exists on the costa, also the small fourth and fifth basal ones; two small yellow spots on each side of the third costal spot on the first vein and another near its base; two on the lower branch of the first fork-cell and one at the base, two pale areas on its stem near the cross-vein; third long vein with four yellow spots, a small one at the base and apex; two small ones on the upper branch of the second fork-cell, one at the apex of lower branch and one at base of the cell; three spots on upper branch of fifth, one at the base of fork and half (basal) the lower branch yellow; three small yellow spots on the sixth.

First sub-marginal cell longer but no narrower than the second posterior cell, its base much nearer the base of the wing, its stem half the length of the cell; stem of the second posterior cell as long as the cell; supernumerary and mid cross-veins close together; posterior longer than the mid about its own length distant from it; fringe pale at the junction of each vein with the costa.

Halteres with dusky stem and black knob.

Length.—6 mm.

♂. Palpi elbowed, apical segments swollen, deep black, a narrow white band at the elbow joint, white scales on one side near the apex and at the apex, penultimate segment with a dense short tuft of brown hairs; antennae deep brown with pale internodes, deep brown hairs with pale grey reflections.

Thorax and legs as in the ♀, but the hind legs show less banding.

Wings with slightly different spotting, the third pale costal spot is broken by a narrow black speck, and the base of the first and fourth veins are all creamy white, there are also many pale scales on the third and the fringe has not any pale spots after the upper branch of the fifth. Fore ungues very unequal, the larger biserrate; mid and hind equal and simple. Claspers black, horny.

Length.—6 mm.

Habitat.—Brazil (Dr. Lutz); Mexico (Nat. Mus. Hung. M. Biro?).

Observations.—Described from three ♀'s and a ♂. Dr. Lutz saw the specimens for a few minutes and said they were *Pyretophorus lutzii*, Cruz. They are certainly not a *Pyretophorus* and belong to the genus described here, characterised by the abnormal head scales.

It differs from *P. lutzii*, Cruz, in first of all being a very black Anopheline and not with a "fawn coloured" mesonotum as in that species; moreover, there are no "erect bifurcated scales" on the occiput, nor is the abdomen "fawn" coloured. In the ♂ also the larger ungues of the fore legs are bi- not uni-serrated. A great part of Cruz's description of *P. lutzii*, however, agrees, and the two might easily be confused unless examined microscopically.

We have seen no specimens of the adult or larva of this species.

Tropical America.

Reported from Rio de Janeiro, Brazil (Cruz), States of Amazonas, Rio de Janeiro, São Paulo (Lutz) and Minas Geraes, Brazil (Peryassú) and also from Mexico (Theobald).

We follow Chagas in the synonymy. He explains that Theobald was led into error by Bourroul, who wrongly indicated forked scales as present on the head. We note that Cruz, in the original description, indicates a black ring on the fourth hind tarsal, while subsequent descriptions state that the last three joints of the hind tarsi are wholly white; however, we feel bound to accept the synonymy indicated by the Brazilian observers, as it is no doubt based upon ample data. Theobald's reference to the occurrence of this species in Mexico is indefinite and we doubt that it exists within the faunal region here considered. It has not occurred to our collectors in Panama, where we should naturally expect to find it if it extends at all into our region. We include it, however, on the strength of Theobald's record.

Considerable confusion exists, owing to the fact that several species of *Anopheles* have been given the name *lutzii* and placed in different genera. This species was described by Cruz under the name *Anopheles lutzii* in a Brazilian publication, which was overlooked by Theobald, who subsequently gave the same specific name to another species (now called *Anopheles boliviensis*, as shown by Knab, Ins. Insc. Menstr., i, 15, 17, 1913). Both names have been retained under different generic titles, but improperly so in any case, as both were originally described in the same genus, and furthermore since we find these different genera invalid. A third species of *Anopheles* (*Manguinhosia lutzi* Cruz) has since been

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given the same specific name, to add to the confusion. Knab referred the species here considered to the synonymy of *Anopheles albitarsis* Lynch Arribálzaga, but that species is distinct, having the abdomen dorsally covered with scales, while *A. lutzii* Cruz has the dorsum of the abdomen devoid of scales.

ANOPHELES TARSIMACULATA Goeldi.

Anopheles argyrotarsis albipes Theobald (in part), Mon. Culic., i, 125, 1901.
Anopheles argyritarsis Durham (not Robineau-Desvoidy), Thompson Yates Lab. Rept., iv, 534, 1902.
Anopheles albipes Gray & Low (not Theobald), Brit. Med. Journ., No. 2143, 194, 1902.
Anopheles argyritarsis Durham (not Robineau-Desvoidy), Liverpool School Trop. Med., Mem. vii, 50, 1902.
Cellia albipes Theobald (in part), Mon. Culic., iii, 110, 1903.
Cellia albipes Bourroul (not Theobald), Mosq. do Brasil, 63, 1904.
Cellia albipes Theobald (in part), Gen. Ins., Dipt., 26 fasc., 11, 1905.
Anopheles tarsimaculata Goeldi, Os Mosq. no Pará, 133, 1905.
Anopheles tarsimaculata Dyar & Knab, Proc. Biol. Soc. Wash., xix, 160, 1906.
Nyssorhynchus cubensis Blanchard (in part, not Agramonte), Les Moustiques, 204, 1905.
Cellia albimanus Coquillett (in part, not Wiedemann), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 13, 1906.
Cellia albimana Theobald (in part, not Wiedemann), Mon. Culic., iv, 106, 1907.
Nyssorhynchus albimanus Autran (not Wiedemann), Anal. Dep. Nac. Hig., xiv, 8, 1907.
Anopheles gorgasi Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 198, 1907.
Anopheles tarsimaculata Busck, Smiths. Misc. Colls., quart. iss., iii, 58, 1908.
Anopheles gorgasi Busck, Smiths. Misc. Colls., quart. iss., iii, 59, 1908.
Cellia albipes Peryassú (not Theobald), Os Culic. do Brazil, 61, 1908.
Cellia albimana Peryassú (not Wiedemann), Os Culicid. do Brazil, 41, 120, 1908.
Cellia albimana Neiva (not Wiedemann), Mem. Inst. O. Cruz, i, 69, 1909.
Cellia albimana Theobald (in part, not Wiedemann), Mon. Culic., v, 69, 1910.
Anopheles gorgasi Theobald, Mon. Culic., v, 86, 1910.
Anopheles tarsimaculata Darling, Stud. Relat. Malaria, Isthm. Canal Comm., 6, 1910.
Anopheles gorgasi Darling, Stud. Rel. Mal., 6, 1910.
Cellia albimana Newstead & Thomas (not Wiedemann), Ann. Trop. Med. & Par., iv, 142, 1910.
Anopheles albimanus Nicholls (not Wiedemann), Bull. Ent. Res., iii, 252, 256, 1912.
Anopheles tarsimaculata Jennings, Journ. Econ. Ent., v, 133, 1912.
Nyssorhynchus cubensis Surcouf & Gonzalez-Rincones (not Agramonte), Arch. Parasitol., xv, 272, 1912.
Cellia albimana Surcouf & Gonzalez-Rincones (not Wiedemann), Arch. Parasitol., xv, 274, 1912.
Anopheles tarsimaculata Knab, Amer. Journ. Trop. Dis. & Prev. Med., i, 36, 1913.
Anopheles tarsimaculata Zetek, Ann. Ent. Soc. Amer., viii, 221, 1915.

ORIGINAL DESCRIPTION OF ANOPHELES GORGASI:

Palpi as long as the proboscis, mostly black scaled, the terminal and penultimate joints light scaled except at the bases and apices; mesothorax gray, with fine brown scales, a black spot in front of the scutellum, a pair of sublateral black spots medially; wings with the veins scaled in black and white, two very large black patches on the costa and a smaller one towards the base and a smaller one at the apex as in *A. albimanus* Wied. The rest of the wing is too much denuded to describe. Abdomen with groups of outstanding scales laterally at the apices of the segments, the dorsum clothed with yellow scales on a dark ground, the lateral tufts black. Legs mostly black-scaled, hind legs with the apical half of the second, the third, and the base of the fourth joints white scaled, the remainder of the fourth and basal half of the fifth segments black, the third joint with a large black patch on the under side which reaches from near the base to beyond the middle. Length, 3.5 mm.

One female, in poor condition, La Boca, Canal Zone, Panama (A. H. Jennings, collector).

Type.—No. 10863, U. S. National Museum.

Named, at the suggestion of Mr. August Busck, in honor of Dr. W. C. Gorgas, Assistant Surgeon-General, U. S. Army, Chief Sanitary Officer of the Isthmian Canal Commission.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF ANOPHELES TARSIMACULATA:

Female.—Proboscis moderate, thicker towards base, straight; vestiture black; labellæ long, lanceolate, luteous, with a few outstanding setæ. Palpi as long as the proboscis, uniform, roughly clothed with long spatulate scales; last two joints white except at their bases; long joint black and white scaled, the

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black scales predominating, the white ones forming a broad ring at tip and a narrow one at false articulation. Antennæ filiform, the joints rather short, subequal, densely pilose, blackish; hairs of whorls short, sparse, black; tori small, subspherical, with an apical cup-shaped excavation, black with gray pruinosity. Clypeus prominent, subtriangular, blackish, pruinose, nude. Eyes well separated at vertex, black. Occiput dark, clothed with erect and semi-erect triangular scales, white on the vertex, black ones on the sides, a group of long white hair-like scales projecting forward on the vertex; a row of setæ along margins of eyes.

Prothoracic lobes small, lateral. Mesonotum elongate, narrow, blackish-brown, pruinose, a pair of velvet-black sublateral spots centrally at anterior ends of a pair of broad bare stripes, a single large black spot on antescutellar space; vestiture of rather sparse, small, broadly lanceolate, curved yellowish-white scales and with rows of short blackish bristles. Scutellum collar-like, uniform, gray pruinose, with a marginal row of black bristles and clothed with small white scales like those of mesonotum. Postnotum elliptical, prominent, dark brown, nude. Pleuræ and coxæ blackish brown, with rows of black bristles and patches of small white scales mostly on the coxæ.

Abdomen subcylindrical, flattened, subtruncate at tip, blackish; dorsal vestiture of rather broad, flat, dull ochreous scales, numerous black bristles, a lateral patch of black scales at posterior angles of segments, forming outstanding tufts; venter clothed with broad yellowish-white scales, with segmental apical patches of black ones forming incomplete apical bands; hairs coarse and abundant, particularly along lateral margins.

Wings (plate 41, fig. 12) moderate, hyaline; petiole of second marginal cell much shorter than its cell, that of second posterior cell longer than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins black and yellowish-white, the outstanding ones lanceolate; black scales in patches as follows: six spots on the costa, first and second small, on basal fifth, third, fourth and fifth large, separated by small yellowish spots, subapical spot small; first vein with five black spots, the first and second small and opposite the third costal spot, the third, fourth and fifth opposite the fourth, fifth and sixth costal spots and nearly as large; second vein with the stem spotted black and yellow, fork with a black patch at base, a spot near base and tip of each branch; third vein with small black spots near base and apex; fourth vein with a black spot at end of stem and one near apex of each fork; fifth vein with a black patch before fork, upper branch with three black patches, lower one with a large subterminal one; sixth vein with a black patch near base and apex; fringe dark, spotted with white at the terminations of veins. Halteres whitish, with dark knobs.

Legs long and slender; femora clothed on outer side with black scales and some yellow ones intermixed, a small black ring just beyond the base, middle and hind pairs with two small white spots just before apex; tibiæ black, a yellow line on inner side; knees white; tarsi black with some yellow scales intermixed; fore and mid tarsi with a white ring at tip of first, second, third, and fifth joints, broadest and most distinct on fore tarsi; hind tarsi with apical half of second joint, all of third and fourth, and apical third of fifth joints white. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Male.—Palpi as long as the proboscis, the last two joints thickened into a distinct club and bearing long brown hairs; the two terminal joints dorsally whitish scaled, with a narrow black ring at the articulations, long joint with a patch of white scales at apex and a median white ring. Antennæ densely plumose; last two joints long and slender, rugose, pilose, black, the others short, pale, with blackish rings bearing long, dense, silky brown hairs. Coloration as in the female. Abdomen long, depressed, rather narrow, very slightly expanded beyond middle; lateral ciliation of rather short, coarse yellowish hairs. Wings

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narrower than in the female, the stems of the fork-cells longer; vestiture more sparse, the black spots on the costa less extensive. Claw formula, 2–0.0–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 39, fig. 263): Side-pieces over twice as long as wide, tips conically rounded; clasp-filament long and slender, slightly attenuated medianly, terminally with an articulated, slender pointed spine inserted before the pointed apex; two closely approximated stout spines with curved tips before middle of side-piece arising from a common base; a stout spine close to base; a basal appendage resembling a harpago, spatulate, with rounded tip.

Larva, Stage IV.—Head elliptical, longer than wide, the antennæ rather large, spinose on inner side; dorsal head-hairs and ante-antennal hairs in a row, stout, amply feathered, those above mouth with the central pair nearly simple, the lateral ones distinctly feathered. Abdomen with six pairs of well-developed fan-shaped tufts, preceded by a smaller pair on first segment (plate 130, fig. 460); lateral plates of eighth segment with long and short irregularly arranged teeth.

The eggs have been figured and described by Dr. Goeldi (Os Mosquitos no Pará, 1905, plate O, figs. 131, 132, 133). They are elongate fusiform, slightly more tapered toward one end, both ends rounded, granular, black; the ribbed floats occupy about three-fourths of the lateral margins and are separated dorsally by about one-third the diameter of the egg itself; ventrally they are very widely separated. The eggs are 0.424 mm. long and 0.185 mm. wide.

Theobald quotes Dr. Low on the habits as follows:

"Breeding-grounds, extremely varied. I have found them in rivers (Dominica), large swamps, small swamps, irrigated cane fields, ditches, trenches, canals, small water-courses, small water-holes, depressions made by the hoofs of smaller cattle and other similar places, also in brackish water, and in a lagoon of water shut off from the sea by a bank of sand only ten yards wide; the interesting point about the latter was that there was no vegetation of any sort in the water except some old sea weed. Any collection of water in the country seems to do for their breeding in, especially when it is more or less thickly grown with algæ and other water-plants . . . I have never found them in water-barrels, tubs, tanks, wells, or other collections of a similar nature in towns. . . . The larvæ die quickly under artificial cultivation if the water is allowed to become foul. The larval stages last fifteen to eighteen days, and the pupal stage two days.

"The adult insect is not in any sense of the term a domestic or house mosquito. They come in to feed just as it is getting dark and leave again in the mornings as it gets light. Searching many native huts by day invariably gave negative results. . . . They are rarely seen during the day and never in bright sunlight. Imprisoned in test tubes, however, they will readily bite men or animals at any time of the day. . . ."

Dr. Peryassú states that the larvæ are carnivorous and cannibalistic. The larvæ may develop in brackish water. He has found associated with these larvæ, those of *Aëdes calopus, Culex quinquefasciatus, Culex coronator, Aëdes fluviatilis, Lutzia bigoti, Psorophora apicalis,* and *Limatus durhamii,* and he has found them in artificial receptacles, as the above associations would indicate.

Tropical America; Lesser Antilles and mainland from Nicaragua southward.

Bluefields, Nicaragua (W. F. Thornton); Tabernilla, Canal Zone, Panama (A. Busck); Colon, Panama (A. H. Jennings); La Boca, Canal Zone, Panama (A. Busck); Surinam (H. Polak); Schoepmoed, Berbice River, British Guiana, April, 1905 (E. D. Rowland); New Amsterdam, British Guiana, May 1, 1907 (J. Aiken); Trinidad, June, July, 1905 (A. Busck); St. Joseph, Trinidad, August 2, 1899 (F. W. Urich); Grenada, West Indies, June 9, 1905 (A. Busck). Reported also from Cachoeirinha, Manáos, Brazil (Durham); São Paulo, Brazil (Lutz); Rio de Janeiro, Acre Territory, States of Amazonas, Pará,

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Bahia, Minas Geraes and Matto Grosso, Brazil (Peryassú); Iquitos, Peru (Newstead & Thomas); St. Lucia (Gray & Low, Nicholls), Dominica, St. Vincent, Grenada and Carriacore, Grenadines (Theobald), West Indies.

Goeldi's name *Anopheles tarsimaculata* was not proposed for a new species, but suggested as a desirable emendation of *albipes*. There is therefore no original description, but the species is figured and with the discussion the new name is published. We have therefore felt justified in recognizing Goeldi's name as the first valid name for the species before us.

Anopheles tarsimaculata closely resembles *A. albimanus* and differs from it in only one important detail, the coloration of the palpi, which shows much more white than in *albimanus*. The abundant material before us shows that this difference is constant and furthermore that the two forms occupy distinct geographic areas. *A. tarsimaculata* occurs in tropical and subtropical South America east of the Andes, in the Lesser Antilles, and extends northward over the Isthmus of Panama to eastern Nicaragua. It is only from Panama northward that *tarsimaculata* and *albimanus* occur together, the latter species extending southward from Panama only on the western side of the Andes. We have seen specimens from only two of the Lesser Antilles, Trinidad and Grenada, but from what we know of insect distribution in the Antilles we are confident that those in the other islands will be found to be *tarsimaculata*. We have examined many specimens from Cuba, St. Domingo, Jamaica and Porto Rico and found them to be invariably *albimanus*.

The wing pattern is identical with that of *Anopheles albimanus* and *A. argyritarsis* and the color of the pale scales is yellowish, as in *albimanus*, and not pure white, as in most *argyritarsis*. We have found only one exception, in one of the specimens from New Amsterdam, British Guiana; in this the light colored wing-scales are pure white and furthermore the scales on the dorsum of the abdomen are light bluish-gray, instead of yellowish as in normal specimens. The wing pattern shows considerable variation, particularly in the extent of the black spots in the costal region. The three largest costal spots may be very closely approximated and separated only by minute yellowish dots, or they may be well separated by larger yellowish patches; in the latter case the large black spot nearest the wing base is usually more or less completely broken, producing an additional small black spot at its distal end. This latter condition is particularly characteristic of the male, where the reduction of the black costal spots appears to be the rule.

According to Nicholls the larvæ of *Anopheles tarsimaculata* may be distinguished from those of *A. argyritarsis* by the presence of "four pairs of brilliant white areas, situated on the front of the thorax and on the second, fifth, and eighth abdominal segments respectively." He states that these markings are only obvious in healthy specimens and we suspect that, like other color peculiarities of *Anopheles* larvæ, they are not reliable. Nicholls states that the pupa likewise "can be distinguished by two large white blotches situated on the posterior part of the thorax."

Anopheles tarsimaculata was included by Theobald in his description of *Anopheles argyrotarsis albipes*, but the major part of that description applies to *albimanus* Wiedemann, and we have accordingly quoted *albipes* under the synonymy of *albimanus*. The specimens before Theobald from British Guiana, Rio de Janeiro, and Antigua are *tarsimaculata*, and the quoted description of the larva belongs here. The specimen from India is doubtless misidentified. Bourroul cites the species wrongly under *albipes*, Blanchard wrongly under *cubensis*, Coquillett and Peryassú wrongly under *albimanus*.

Reexamination of the single type-specimen of *Anopheles gorgasi* Dyar and Knab has convinced us that it is an abnormality and referable to *tarsimaculata*. The specimen is in poor condition and lacks the last three tarsal joints of the right hind leg. The left hind tarsus has the third joint white-scaled with an elongate black spot beneath; the fourth joint is black-scaled with a white ring

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at base; the fifth joint is black on the basal half, the apical half is much denuded but apparently was white-scaled. In other respects the specimen agrees with *tarsimaculata* and the fact that among the many hundreds of specimens of *Anopheles* from the Panama region which we have had occasion to examine, no like specimen has appeared, has led us to conclude that the difference in the tarsal markings is an abnormality.

ANOPHELES ALBIMANUS Wiedemann.

Anopheles albimanus Wiedemann, Dipt. exot., 10, 1821.
Anopheles albimanus Robineau-Desvoidy, Mém. Soc. Hist. Nat. Paris, iii, 411, 1827.
Anopheles albimanus Wiedemann, Aussereurop. zweifl. Ins., i, 13, 1828.
Anopheles albimanus von Röder, Ent. Zeit., Stettin, xlvi, 338, 1885.
Anopheles species, Guiteras, Rev. de Med. Trop., i, 17, 1900.
Anopheles cubensis Agramonte, El Progreso Medico, x, 460, 1900.
Anopheles albimanus Giles, Handb. Gnats or Mosq., 144, 1900.
Anopheles argyrotarsis albipes Theobald, Mon. Culic., i, 125, 1901.
Anopheles argyritarsis Howard (not Robineau-Desvoidy), Mosquitoes, 117, 240, 1901.
Anopheles albimanus Giles, Gnats or Mosq., 2 ed., 294, 1902.
Laverania argyrotarsis albipes Theobald, Journ. Trop. Med., v, 183, 1902.
Anopheles argyritarsis Howard (not Robineau-Desvoidy), Proc. Ent. Soc. Wash., v, 100, 1902.
Cellia argyrotarsis Stephens & Christophers (not Robineau-Desvoidy), The Practical Study of Malaria, 205, 1903.
Anopheles argyrotarsis sub-sp. ***albipes*** Parker, Beyer & Pothier, Bull. 13, Yellow Fever Inst., Public Health and Mar.-Hosp. Service, 38, 1903.
Anopheles argyrotarsis albipes Taylor, Revista de Med. Trop., iv, 149, 159, 166, 172, 1903.
Cellia albipes Theobald (in part), Mon. Culic., iii, 110, 1903.
Anopheles argyritarsis albipes Pazos, Bull. Soc. Ent. France, 1904, 134, 1904.
Cellia albipes Giles, Rev. Anophel., 46, 1904.
Nyssorhynchus cubensis Blanchard (in part), Les Moustiques, 204, 1905.
Anopheles dubius Blanchard, Les Moust., 205, 1905.
Cellia argyrotarsis albipes Goeldi (in part), Os Mosq. no Pará, 129, 1905.
Cellia albipes Theobald, Mosq. or Culic. of Jamaica, 15, 1905.
Cellia albipes Theobald (in part), Gen. Ins., Dipt. 26 fasc., 11, 1905.
Cellia albipes Felt, Bull. 97, N. Y. State Mus., 470, 1905.
Anopheles argyrotarsis albipes = ***Nyssorhynchus cubensis*** Coronado, Agramonte y Agostini, Etiologia y profilaxis del Paludismo en Cuba (Revista Assoc. Médico-Farmacéutica de Cuba), p. 27 of separate, 1906.
Anopheles albimanus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 7, 1906.
Cellia albimanus Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 13, 1906.
Anopheles albimanus Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xiv, 176, 1906.
Anopheles albipes Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 175, 1906.
Cellia albimana Theobald (in part), Mon. Culicid., iv, 106, 1907.
Anopheles albipes Howard, Osler's Modern Medicine, i, 383, 386, 1907.
Anopheles albimanus Busck, Smiths. Misc. Colls., quart. iss., iii, 57, 1908.
Cellia albipes Prout, Ann. Trop. Med. & Paras., iii, 487, 1909.
Anopheles albimanus Pazos, San. y Ben., ii, 45, 177, 1909.
Cellia albimana Theobald (in part), Mon. Culic., v, 69, 1910.
Anopheles albimanus Darling, Stud. Rel. Malaria, Isthm. Canal Comm., 6, 1910.
Anopheles albimanus Jennings, Journ. Econ. Ent., v, 132, 1912.
Anopheles albimanus Knab, Proc. Ent. Soc. Wash., xiv, 80, 1912.
Anopheles albimanus Knab, Journ. Econ. Ent., v, 198, 1912.
Anopheles albimanus Knab, Amer. Journ. Trop. Dis. & Prev. Med., i, 34, 40, 1913.
Anopheles albimanus Zetek, Ann. Ent. Soc. Amer., viii, 221, 1915.

ORIGINAL DESCRIPTION OF ANOPHELES ALBIMANUS:

Fuscus, abdomine maculis magnis trigonis griseis, alis fusco-maculatis, tarsorum apice niveo. Longit. lin. 2⅔. ♀. Ins. St. Domingo.

Palporum articuli apice nivei. Abdominis singula segmenta macula grisea apice antrorsum directa. Alarum costa fusco-nigra, flavido ita intersecta ut maculae longitudinales formentur; in margine alarum interno et disco quoque maculae apparent sed multo minores. Mus. nostr.

ORIGINAL DESCRIPTION OF ANOPHELES ARGYROTARSIS ALBIPES:

This form resembles the type in all respects except that the last tarsal joint in the hind legs has a very distinct and persistent deep black basal band. The thorax is rather browner in some specimens, and there are only two white bands to the

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♀ palpi. The fore legs have dark scaled femora, pale beneath, with a small white knee spot, the tibiae dusky scaled and also the metatarsus above, pale below, apex white; the first two tarsi have yellow apical bands, the third dark, and the last clay coloured; mid legs with a white spot near the apex of the femora; mid tarsi not definitely banded, but with a faint pale band sometimes at the apex of the metatarsus; the hind legs are dark brown, with the second, third, and apex of the first tarsal joints pure white, the last joint white, with a distinct black basal band; ungues as in the type. Wings much as in the type, but the pale scales are more yellow in colour.

Length.—♂ 3.5 to 4.5 mm.; ♀ 4 to 4.5 mm.

Habitat.—Jamaica (Grabham) (♀ 7. 12. 1899, and 8. 2. 1900); British Guiana (Rowland); Rio de Janeiro (Lutz); Antigua (Forrest). India (Giles).

Time of capture.—November to March in Jamaica; July British Guiana. . . . .

ORIGINAL DESCRIPTION OF ANOPHELES CUBENSIS:

Este mosquito fué encontrado en la Isla de Cuba, (Quemados) por el Dr. Lazear en Junio de 1900 y enviado al Dr. Howard para su clasificación. De los mosquitos conocidos se parece más al *A. albitarsis* que á ningún otro. Ulteriormente ha sido estudiado por el Dr. Guiteras, el Dr. Dávalos y nostros. Es indudable que este mosquito constituye una variedad distinta de las descritas hasta la fecha, como se verá por la descripción que de la "Nota Preliminar" del Dr. Guiteras, copiamos integra. (*Revista de Medicina Tropical*).

"Examinando las larvas encontramos que presentan los caracteres que señala "Grassi como caracteristicos de las larvas del *A. superpictus*. Es decir, que por "encima de cada uno de los mechones de cerdas que adornan la parte lateral del "Clipeus, se proyecta hácia adelante una espira, ó gruesa cerda, que presenta un "ligero indicio de arborización.

"Esta es la única larva de Anopheles que hemos encontrado en los lugares "mencionados, con excepción de una que encontramos en Matanzas, que presentaba "los caracteres del *A. bifurcatus;* es decir, una espina lisa. De esta última larva "no pudimos obtener la imagen correspondiente.

"De la otra larva sí hemos logrado seguir la evolución completa y hemos obtenido "un gran numero de insectos perfectos. Estos resultan no pertener precisamente "á la especie arriba mencionada, *A. superpictus;* pero sí al grupo de varias especies "que se asemejan entre sí, y que incluye además del *superpictus*, el *seudopictus*, el "*costalis* y otros.

"Aseméjase nuestro anófeles común en la distribución de las mancha de las alas "al *costalis* que es la especie común en el Africa tropical occidental; pero presenta "diferencias que sin duda harán de él una especie distinta. Diferénciase también "del *anófeles albimanus* descrito por Vied en Jamaica y por Von Roder en Puerto-"Rico, si podemos juzgar por la descripcion que aparece en el libro de Giles.

"*Descripcion preliminar del insecto.*—Se posa este en la actitud caracteristica "descrita por Ross, es decir, formando la probosis y el abdomen una línea casi "recta, que invariablemente forma con la superficie donde descansa el insecto un "ángulo de 45 ó más grados, según lo indica la figura adjunta.

"En la hembra los dos palpos, del mismo largo que la probosis se llevan casi "siempre en contacto con ésta, formando una trompa tan larga, y casi tan gruesa "como el abdomen cuando el insecto no ha chupado sangre. El palpo consta de "cinco articulos cubiertos de escamas grandes y de escasas cerdas. La extremidad "terminal de cada palpo presenta un tenue anillo blanquecino, excepto el último "articulo que es todo blanco.

"La terminación de la oliva es también blanquencina.

"Las antenas constan de catorce articulos contando con la torula, y presentan un "color parduzco. Los ojos presentan ribete blanco, y en la nuca se observa un "penachito de escamas, blanquecinas algunas.

"El tórax es carmelita, tomentoso en la parte superior. Las pleuras presentan "una ligera estriación amarillosa.

"Las patas. El primer par presenta algún engrosamiento de la mitad proximal "del fémur. El color es oscuro con algunas pequeñas manchas atigradas. La tibia "es más gruesa en su extremidad distal, y de color oscuro. El primero, segundo "y tercer tarso presentan anillos blanquecinos terminales. El cuarto y quinto son "oscuros.

"El segundo par presenta algún engrosamiento de la extremidad distal del fémur. "También presenta este las mismas manchas atigradas. Los tarsos son oscuros, "excepto la mitad distal del último que clarea algo.

"El tercer par, más delgado y más largo que los otros. Fémur como en el segundo "par. El primer tarso es oscuro. El segundo tarso presenta la mitad distal de un "blanco nivéo. Del mismo color son el tercero y cuarto tarso. El último tarso "presenta le extremidad superior oscura, y la inferior blanquecina.

"La ungulatura de la hembra, como en las otras especies de anófeles, presenta "la fórmula 0.0–0.0–0.0.

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"Los palpos del macho son casi tan largos como la probosis. El primero y "segundo artículo presenta una separación indistinta. El tercer artículo se dilata "en forma de cono con la base hácia la extremidad distal: El ápice del cono es "ligeramente blanquecino; la base presenta un anillo blanco. El cuarto artículo "es más corto y de forma cónica también, su base tocando con la del anterior. De "la base del cuarto artículo sale un escobillón de cerdas largas, muchas de las "cuales son pardas hacia la punta. La extremidad distal de este artículo es blanca. "El quinto artículo, pequeño y cónico también presenta la parte ancha, proximal, "oscura y la extremidad apical clara.

"La manera de distribución de las manchas en el ala podrá apreciarse en el "adjunto diagrama."

El insecto que nos ocupa está al parecer bien diseminada por toda la Isla. El primer ejemplar que vimos lo recogió el Dr. Lazear en los Quemados, (Campamento de Columbia) en Junio del presento ano; más tarde, (Julio 6) capturamos nuestra primera muestra en las faldas del Castillo del Principe, alrededores de la Habana; de entónces acá el Dr. Guiteras lo obtuvo de Matanzas, el Dr. Dávalos del Cerro y nosotros en Pinar del Río, habiendo recibido varios ejemplares de Bayamo, Cienfugos y Santa Clara. Abunda este anopheles en las charcas que so forman en las canteras abandonadas del Vedado y de Jesús del Monte, (Habana).

DESCRIPTION OF FEMALE, MALE, AND LARVA OF ANOPHELES ALBIMANUS:

Female.—Proboscis moderate, thicker towards base, straight; vestiture black, labellæ long, lanceolate, luteous, with a few outstanding setæ. Palpi as long as the proboscis, uniform, roughly clothed with long spatulate scales; last joint and articulation of preceding one white, long joint black with a narrow white ring at middle. Antennæ filiform, the joints rather short, subequal, densely pilose, blackish; hairs of whorls short, sparse, black; tori small, subspherical, with an apical cup-shaped excavation, black with gray pruinosity. Clypeus prominent, subtriangular, blackish, pruinose, nude. Eyes well separated at vertex, black. Occiput dark, clothed with erect and semi-erect elliptical and truncate white scales medianly, black ones on the sides, a group of long white hair-like scales projecting forward on the vertex; a row of hairs along margins of eyes.

Prothoracic lobes small, lateral. Mesonotum elongate, narrow, grayish-brown, pruinose, a pair of velvet-black spots centrally at anterior ends of a pair of broad sublateral bare stripes, and another large spot before scutellum; vestiture of rather sparse, small, broadly lanceolate, curved ocherous scales and with rows of short blackish bristles. Scutellum collar-like, uniform, gray-pruinose, with a marginal row of black bristles and clothed with small white scales like those of mesonotum. Postnotum elliptical, prominent, dark brown, nude. Pleuræ and coxæ blackish-brown, with rows of black bristles and small patches of white scales, mostly on the coxæ.

Abdomen subcylindrical, flattened, subtruncate at tip, blackish; dorsal vestiture of rather broad, flat, pale yellow scales, numerous black bristles, a lateral patch of black scales on posterior angles of segments, forming outstanding lateral tufts; venter clothed with broad yellowish scales, with segmental apical patches of black ones forming incomplete apical bands; hairs coarse and abundant, particularly along lateral margins.

Wings (plate 41, fig. 14) moderate, hyaline; petiole of second marginal cell about half as long as its cell, that of second posterior cell longer than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins black and yellowish-white, the outstanding ones lanceolate, the black in patches as follows: six spots on the costa, first and second small, on basal fifth, third, fourth, and fifth large, sixth subapical and small; first vein with five black spots, the first and second small and opposite the third costal spot, the third, fourth and fifth opposite the fourth, fifth and sixth costal spots and nearly as large; second vein with the stem spotted black and yellow, fork-cell with a black patch at base, a spot near base and tip of each fork; third vein with a small black spot at base and near apex; fourth vein with a long black patch before fork, two black spots on upper branch and one subapically on lower; fifth vein with a black patch before the fork, upper branch with three black patches, lower one with a small terminal one; sixth vein with a black patch near

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base and another before apex; fringe dark, spotted with white at ends of veins. Halteres whitish, with dark knobs.

Legs long and slender; femora clothed on outer side with black scales and some yellow ones intermixed, a small black ring just beyond base, middle and hind pairs with two white spots just before apex, under side continuously yellowish except at apex; tibiæ black, a yellow line on inner side; knees white; tarsi black with some yellow scales intermixed; front tarsi with first, second, and third joints broadly ringed with white; mid tarsi without distinct marks; hind tarsi with apical half of second joint, all of third and fourth joints white, a black ring at basal third of fifth joint. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Male.—Palpi as long as the proboscis, the last two joints thickened into a distinct club and bearing long black and yellowish hairs; last joint with apical two-thirds silvery-white scaled, base black; penultimate joint narrowly white scaled at apex; long joint white scaled at apex and with a median white ring. Antennæ densely plumose; last two joints slender, rugose, pilose, black, the others short, pale, with blackish rings bearing long, dense, silky brown hairs. Coloration as in the female. Abdomen long, depressed, rather narrow, very slightly expanded beyond middle; lateral ciliation of rather short, coarse yellowish hairs. Wings narrower than in the female, the stems of the fork-cells longer; vestiture more sparse, the black spots along the costa less extensive. Claw formula, 2–0.0–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 39, fig. 264): Side-pieces twice as long as wide, tapering, the tips rounded; clasp-filament long and slender, about as long as the side-piece, medianly slightly attenuated, terminally a short inserted claw, preceded by a small seta; two approximated coarse spines with recurved tips arising from a peduncle near middle of side-piece and a single slenderer spine further inward; a stout rod from a peduncle at extreme base; false harpes long, smooth; unci forming a basal plate with deep central notch.

Larva, Stage IV.—Head elongate, rounded, bulging at the sides, antennæ laterally inserted, portion before antennæ conically produced; four dorsal head-hairs in a line between antennæ, single but amply feathered, a small hair at base of antennæ; two long approximate spines on clypeus. Antennæ rather large, subcylindrical, slightly tapered, spined throughout, spines on inner side very coarse; a tuft of feathered hairs from basal fourth; two long terminal digits, two short ones and a long slender hair-tuft. Eyes large, normal. Mental plate with a rounded apical tooth and four on each side; first three evenly spaced, fourth small and basally situated. Mandible quadrangular; a row of branched hairs on dorsal aspect near base, followed by a little tuft and two small filaments; five long filaments before tip; an outer row of cilia; eight feathered filaments on outer margin; terminal dentition produced, of five small teeth, the third the largest; two serrate filaments within; a long dentate process below, composed of confluent spines; basal angle roundedly upcurved; a row of long hairs at base. Maxilla rounded rectangular, concave on outer margin, inner angle shorter; densely covered with short curved hairs; two small approximate filaments crossing an indistinct suture; palpus obliquely attached, conical, with a large dendritic tuft without, numerous short appendages at tip, some of which are spatulate. Thorax subquadrate, about as long as wide; hairs short, consisting of branched hairs, single hairs and tufts; mesothorax sparsely haired. Abdomen stout, anterior segments shorter; long feathered lateral hairs on first three segments, double on first and second, single on third; hairs on succeeding segments small, smooth; a series of well-developed subdorsal fan-shaped tufts on second to seventh segments (plate 130, fig. 460); a pair of smaller ones on the first segment. Air-tube sessile, subquadrate, roundedly angled posteriorly. Lateral plates of eighth segment posteriorly with a series of spines, irregu-

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larly alternating long and short, the longest of the short ones less than half as long as the longest of the long ones. Anal segment about as long as wide, with a small dorsal plate; dorsal brush a long and a shorter tuft on each side; a single long lateral hair below the plate; ventral brush well developed, of long branched tufts; anal gills moderate, about as long as the segment, blunt pointed.

The species is in many localities within its range the most abundant *Anopheles*. The female is very bloodthirsty and is the most efficient host of the malarial parasites. On this account the species is of the greatest economic importance. The females enter houses in much larger numbers than the other species, even though some of the latter may be equally abundant in the locality. Its presence, or abundance, depends upon local conditions, chief of which are breeding facilities and the blood supply. It would seem that the species does not occur in uninhabited regions.

The breeding-places are usually ground-pools of a more or less transient character that may be altogether free from algæ. The larvæ appear to thrive best in brackish water. The species has been found breeding in enormous numbers in brackish swamps of a temporary character on the Isthmus of Panama. On one occasion Mr. Jennings found the larvæ in pools formed by the washing over of a very high tide, and which, therefore, must have been pure sea-water. Analysis of water from brackish swamps in which Mr. Jennings found *Anopheles albimanus* breeding abundantly showed .92% and 1.93% of sodium chloride.

Mr. Knab found a larva in a newly-dug ditch along a railroad; Mr. Busck in a puddle in the woods frequented by swine and in a stagnant ill-smelling pool caused by dumping operations; Mr. Jennings got them in a rapidly running river, in swamps both of fresh and brackish water, puddles in a field, ditches and puddles in the Panama canal-cut, and in hoof prints. Mr. Busck found the larvæ associated with *Anopheles pseudopunctipennis, Culex coronator, Culex leprincei,* and *Culex interrogator.*

We quote the following from Mr. Jennings, based upon his experinece in the Panama region:

"The breeding places of this species show great diversity of character, though preference is shown by the mosquito for stagnant, fairly pure water, exposed to direct sunlight, with a growth of Spirogyra, which alga is a favorite food. Sewage contamination is inimical to the species when such contamination is marked. Rapidly flowing water also is unsuitable and streams with strong current are usually quite free, except in back waters and hollows where the current is little felt. I have never taken *albimanus* in artificial containers except in one or two instances when the occurrence was evidently purely accidental. With the exception of foul or swift water they may occur in almost any collection of water, however small or seemingly unsuited to mosquito propagation. Hoof-prints, wheel-ruts, the smallest puddle or thinnest film of water seeping upon the ground from a wet hillside, particularly if the ubiquitous algæ are present, are points of danger and must be included in control work. For an *Anopheles* the flight of *albimanus* is strong. . . . While not domestic in the same sense as *Stegomyia calopus, Anopheles albimanus* is closely associated with man and finds its most congenial surroundings about his habitations and in the conditions he creates in the course of agricultural, engineering and other work. This fact is correlated with the highly developed blood-sucking habit."

Agramonte states that in Cuba the fertilized females pass the winter in a state of lethargy in considerable numbers, hiding in stables and other buildings.

Continental America from Mexico to Ecuador and the Greater Antilles; southern Florida.

Manzanillo, Mexico (A. Dugès); Palizada, Mexico (A. Dugès); San Blas, Mexico (A. Dugès); Santa Lucrecia, Mexico, October, 1911 (F. W. Urich); Tampico, Mexico, September 3, 1902 (J. Goldberger), December 5, 1909 (F. C.

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Bishopp); Bluefields, Nicaragua (———); Puerto Barrios, Guatemala, August 18, 1903 (W. L. Stone); San José, Guatemala, May 6, 1905 (F. Knab); Port Limon, Costa Rica, September 27, 1905 (F. Knab); Bocas del Toro, Panama, September 28, 1903 (P. Osterhout); Tabernilla, Canal Zone, Panama, April 26, 1907 (A. Busck); La Boca, Canal Zone, Panama (A. Busck); Gatun, Canal Zone, Panama (A. Busck); Taboga Island, Panama Bay, Panama (A. Busck); Italian Camp, Ancon, Canal Zone, Panama, November 22, 1907 (A. H. Jennings); Pedro Miguel, Canal Zone, Panama, December 7, 1907 (A. H. Jennings); Miraflores, Canal Zone, Panama, December 10, 1907 (A. H. Jennings); Road to Comacho dam, Canal Zone, Panama, December 20, 1907 (A. H. Jennings); Caldera Island, Porto Bello Bay, Panama, January 4, 1908 (A. H. Jennings); Las Cascadas, Canal Zone, Panama, February 5, 1908 (A. H. Jennings); East Corozal, Canal Zone, Panama, June 27, 1908 (A. H. Jennings); San Pablo, Canal Zone, Panama (A. H. Jennings); near Panama City, Panama, December 6, 1907 (A. H. Jennings); Guayaquil, Ecuador (F. Campos); Kingston, Jamaica (M. Grabham); San Francisco Mountains, Santo Domingo, April, 1905 (A. Busck); Porto Rico, December, 1913 (W. R. Whippitt); Havana, Cuba (J. R. Taylor), October, 1900 (J. Carroll); San Antonio de los Baños, Cuba (J. H. Pazos); Key West, Florida (C. H. Gardner).

The species *Anopheles albimanus* was established by Wiedemann in 1821. It was redescribed by Agramonte under the tentative name *cubensis* in 1900, and by Theobald in 1901 under the name *albipes* as a variety of *argyritarsis*. Blanchard cites in the synonymy of this species "*Anopheles dubius* Theobald, 1901." We have been unable to trace this name in the writings of Theobald and are therefore obliged to credit it to Blanchard.

The species agrees closely in most of its characteristics with *Anopheles argyritarsis*, the most marked difference being the presence of a black ring on the last joint of the hind tarsi in *albimanus*. The wing pattern is practically identical in the two species, but in *argyritarsis* the light colored scales are usually pure white while in *albimanus* they are distinctly ochreous yellow. The three velvet-black spots on the mesonotum are very distinct in *albimanus*, while usually they are not particularly obvious in *argyritarsis*. Unless these differences are kept in mind specimens of *albimanus* with the hind tarsi broken are likely to be mistaken for *argyritarsis*.

As in *Anopheles tarsimaculata* and *A. argyritarsis*, the wing pattern is variable in the relative extent of the dark and light scales, particularly on the costa. In the male the black spots on the costa are less extensive and the large spot nearest the wing-base is divided near its distal end; females occur which vary more or less in the same direction. In lots received in 1912 from the Gatun region of the Panama Canal Zone, during the time of the great flight already mentioned, some of the females show a variation in the coloration of the palpi in the direction of *tarsimaculata*. These specimens have the penultimate joint of the palpi more or less yellowish scaled with a black ring at the base, the long joint with a white apical ring, as in *tarsimaculata*. As some typical *tarsimaculata* were taken in the same lot it is possible that the two forms were interbreeding as a result of inordinate multiplication due to the conditions then existing; at all events we have not seen such intermediate specimens from other localities, even where the two forms occur together. The distribution of *Anopheles albimanus* has been discussed in connection with *tarsimaculata*. As far as our present information goes the species extends from Mexico to Panama on the mainland and only extends into South America on the Pacific coast; in the West Indies it is restricted to the Greater Antilles. Theobald, in his original description of *albipes*, includes specimens from South American localities, he evidently having overlooked the difference in the ornamentation of the palpi. He even mentions India as a locality, but this is clearly a misidentification originating with Giles.

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ANOPHELES BELLATOR Dyar & Knab.

Anopheles bellator Dyar & Knab, Proc. Biol. Soc. Wash., xix, 160, 1906.
Anopheles bellator Busck, Smiths. Misc. Colls., quart. iss., lii, 58, 1908.
Anopheles bellator Theobald, Mon. Culic., v, 86, 1910.

ORIGINAL DESCRIPTION OF ANOPHELES BELLATOR:

Palpi black; head black, a tuft of pale scales between the eyes. Thorax gray, with four black longitudinal lines, the two nearest the middle narrower and stopping short of the base, the two lateral ones attaining the scutellum; before scutellum a short median black line; pleurae dark, with two white stripes. Abdomen entirely dark. Costa of wing with six white spots, one basal, the last at extreme apex; third vein white, with a black spot at apex and near base; fifth vein white near base and at base of the fork, and a small white spot on upper branch; fringe with two white spots, at lower fork of fourth vein and upper fork of fifth vein respectively. Front legs with the femora with a black spot at base, a black dash at middle third and two black spots at apex; tibiae dark above, with two black, nearly encircling, spots at apex; first tarsal joint with a black ring near the base, second and third joints black at the base, fourth and fifth entirely black. Mid legs with the femora mostly black; tibiae black, white at tip; first tarsal joint black, white at tip; second black at base, apical half white; third and fourth joints black, white at tip; fifth black. Hind legs with femora white, black above, with a black ring at the outer third; tibiae black above with two black rings toward apex; first tarsal joint black, with a white apical ring and white at extreme base; second, third and fourth joints black, with white apical ring; fifth joint black.

Three specimens, Trinidad, B. W. I. (F. W. Urich; A. Busck).

Type.—Cat. No. 10,027, U. S. Nat. Mus.

Near *A. lutzii* Cruz, but differs in the coloration of the palpi and legs. According to Dr. Lutz, *A. lutzii* was first described by Dr. Oswald Cruz in the Brazil Medico. Theobald redescribes it as a new species; but it should be credited to Cruz.

DESCRIPTION OF FEMALE AND MALE ANOPHELES BELLATOR (LARVA UNKNOWN):

Female.—Proboscis moderate, straight, uniform; labellæ long, lanceolate, with fine outstanding setæ; vestiture black. Palpi as long as the proboscis, uniform, stout, roughened by long erect spatulate scales, black, a few whitish scales at base of last joint. Antennæ filiform, the joints subequal, rather short, blackish, densely pilose; hairs of whorls sparse, black, short; tori subspherical with an apical cup-shaped excavation, blackish-brown with a luteous rim. Clypeus prominent, subtriangular, black, nude. Eyes black. Occiput with a median groove, blackish, clothed with erect, broad, triangular black scales, a few scattered white ones and a group of them in the center of vertex, a group of long white hairs projecting forward between the eyes, a row of long black hairs along margins of eyes.

Prothoracic lobes small, lateral. Mesonotum narrow, elongate, gray, pruinose, a pair of narrow longitudinal velvet-black stripes on the disk, between them a very narrow median stripe, extending from anterior margin to posterior third, outwardly from these a broader velvet-black stripe extending the entire length of mesonotum and separated from lateral margins by about its own width; the gray intervals bear fine pale yellow hairs arising from small black punctures; some rather broad, suberect yellowish-white scales along anterior and lateral margins. Scutellum collar-like, grayish, with long dark brown marginal bristles. Postnotum elliptical, prominent, dark brown, nude. Pleurae blackish-brown with two pale transverse bars, coxæ luteous, with fine hairs and small patches of white scales.

Abdomen subcylindrical, depressed, tip truncate, brownish-black, without scales, rather evenly clothed with numerous fine yellowish hairs.

Wings (plate 41, fig. 9) moderate, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell longer than its cell; basal cross-vein distant about its own length from anterior cross-vein; outstanding scales of veins broadly linear, black with white scales in spots as follows: four on the costa, five on first vein, all except the first opposite those on the costa, a small spot at base of third vein and a very long one at middle, a long spot in the middle of fifth vein not involving its upper branch, one near its base and a small one on upper branch; fringe dusky, with pale spots at lower branch of second, lower

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branch of fourth and upper branch of fifth veins. Halteres pale, with dark knobs.

Legs long and slender; vestiture black and white; femora and tibiæ dark, white lined on the sides; femora with a small black ring close to base; knees white; fore tarsi with first joint yellowish, a black ring near base and a black dash above beyond middle, second and third joints yellowish with black basal rings, fourth and fifth joints dark scaled; mid tarsi dark scaled, first joint with a broad yellowish-white ring at apex, second and third with the apical three-fourths yellowish-white, fourth and fifth without distinct white marks; hind tarsi with moderate white rings at apices of first four joints, fifth joint all black, a narrow white ring at base of first joint. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Male.—Palpi about as long as the proboscis, with the tip of the long joint and the last two joints swollen to form a club and with long blackish hairs; vestiture black, last two joints dorsally white-scaled, dark at bases, a white ring at middle of long joint. Antennæ plumose; last two joints long and slender, rugose, black; the others also rather long, slender, pale, with broad black basal ring; hairs of whorls long, dense, blackish. Coloration as in the female, the abdomen more hairy. Wings narrower than in the female, the vestiture less abundant. Claw formula, 2–0.0–0.0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Genitalia (plate 38, fig. 256): Side-pieces over twice as long as wide, tips conically rounded; two stout setæ near middle of inner margin of side-piece and one toward base; a long seta close to base; a pair of flattened rounded basal appendages bearing a fringe of long fine hairs. Clasp-filament long, slender, attenuated in the middle, with a small sharp terminal claw.

The larvæ live in the water held by the leaf-bases of Bromeliaceæ. Mr. Busck found it associated with larvæ of *Culex imitator* and *Wyeomyia abascanta*.

Trinidad, West Indies.

Trinidad, June, 1905 (A. Busck); Trinidad (F. W. Urich).

We have received no specimens of *Anopheles bellator* since the original types. It is probably more widely spread, but, as it is not taken unless bred and occurs in such unusual situations, it is seldom collected. It represents in northern South America the widely distributed *Anopheles boliviensis* Theobald.

ANOPHELES NEIVAI, new species.

Anopheles lutzii Busck (not Cruz, not Theobald), Smiths. Misc. Colls., lii, 58, 1908.
Anopheles crusii Dyar & Knab (in part), Proc. U. S. Nat. Mus., xxxv, 53, 1908.
Anopheles crusii Darling (not Dyar & Knab), Stud. Rel. Malaria, Isthm. Canal Comm., 10, 1910.
Anopheles species near *crusi* Jennings, Journ. Econ. Ent., v, 135, 1912.
Anopheles neivai Knab (*nomen nudum*), Amer. Journ. Trop. Dis. & Prev. Med., i, 35, 1913.
Anopheles neivai Picado (*nomen nudum*), Bull. Scient. France & Belg., 7 Sér., xlvii, 353, 1913.

DESCRIPTION OF FEMALE AND LARVA OF ANOPHELES NEIVAI (MALE UNKNOWN):

Female.—Proboscis moderate, straight, slightly enlarged basally; labellæ long, lanceolate, with fine outstanding setæ; vestiture black. Palpi as long as the proboscis, roughened by long erect spatulate black scales, a few whitish scales at apices of last two joints. Antennæ filiform, the joints subequal, rather short, blackish, densely pilose; hairs of whorls rather short, sparse, black; tori subspherical, with a cup-shaped apical excavation, deep brown, pruinose. Clypeus prominent, subtriangular, blackish, nude. Eyes black. Occiput densely clothed with erect spatulate black scales and a few scattered white ones, densest in front on the median line, a tuft of long white hairs projecting forward between eyes, a row of long black hairs along margins of eyes.

Prothoracic lobes small, lateral. Mesonotum narrow, elongate, gray pruinose, with four longitudinal brownish-black stripes, two of them narrower and rather closely approximated mesially terminate at antescutellar space, the others

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submarginal, broader and irregularly dilated on anterior half, and extending the entire length; vestiture of rows of pale yellowish hairs, some pale scales at anterior and lateral margins. Scutellum collar-like, gray pruinose, with deep brown marginal bristles and short brownish hairs. Postnotum elliptical, prominent, blackish, nude. Pleurae blackish-brown with two transverse whitish stripes, coxae pale; vestiture of scattered pale hairs.

Abdomen subcylindrical, depressed, tip subtruncate; blackish, with traces of a brown median line, clothed with numerous fine brown hairs and with longer blackish ones, particularly at sides and beneath; under surface paler, particularly the bases of segments.

Wings (plate 41, fig. 8) moderate, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell longer than its cell; basal cross-vein distant less than its own length from anterior cross-vein; outstanding scales of wing-veins narrowly lanceolate, black, with white scales in spots as follows: three spots on the costa, one minute one near basal third, two rather small spots on the apical third, five spots on first vein, the first near the base long, the second, fourth, and fifth opposite the costal spots; third vein with a small white spot at base; fifth vein with an elongate spot towards base and another at base of fork; fringe dusky, with whitish spots at the ends of most of the veins.

Legs long and slender; vestiture black and white; femora blackish, white lined beneath, with a narrow black ring near base, hind pair with a white streak on outer side on basal two-thirds and an oblique white mark at apical third; fore tibiae predominatingly yellowish-white, a narrow black line on inner side, with a pre-apical black patch and white apex; mid and hind tibiae similarly marked to the fore ones, a black ring near base and another subapically; tarsi black and white; fore tarsi black beneath, dorsally white, the first joint with a black ring towards base and another near middle, second, third and fourth joints black at base, fifth nearly all black; mid tarsi black beneath, first joint with a long white mark on outer side and a large dorsal white patch at apex, second joint with the apical two-thirds dorsally white, third joint with an apical white patch dorsally, fourth and fifth joints all black; hind tarsi with broad white rings occupying more than apical half on second, third and fourth joints, the last joint nearly all white, first joint with a narrow white ring at base, a broader one at apex and one before middle prolonged dorsally into a streak to near apical ring. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 2.8 mm.

Type: Cat. No. 20440, U. S. Nat. Mus.

Larva, Stage IV.—Head rounded, longer than wide, conically produced between the antennae; antennae moderate, finely spinulate within, a short simple hair near base; dorsal head-hairs simple, ante-antennal hairs long, tufted outwardly; median pair of anteclypeal hairs long and simple, outer pair shorter, stout and spinulose at tip; hairs below anterior angles rather long, branched towards apex. Thorax with lateral hairs well developed, some longer ones at anterior and lateral angles very sparsely feathered, the others amply feathered. Abdomen with six pairs of small dorsal fan-shaped tufts (plate 130, fig. 461), the single elements of which are ligulate with straight truncate tips; lateral hairs in twos and amply feathered on first two segments, single, very long and sparsely feathered on third to sixth segments; secondary hairs simple. The lateral plates of eighth segment with all the teeth long, uniform, rather dense. Anal segment with rather large dorsal plate; lateral hairs single, unfeathered, rather long; ventral brush of rather sparse but long, branched and amply feathered hairs.

The larvae live in the water held by the leaf-bases of epiphytic bromeliads. There are no algae in the bromeliads, but there are no observations to show that the larvae are predaceous. The species has been bred from larvae by Mr. Jennings in Panama and by Mr. Picado in Costa Rica. Knab found a larva, apparently of this species, at Córdoba, Mexico, but did not succeed in rearing it.

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This larva was bright green, although there were no algæ visible in the water from the bromeliad which it inhabited.

Dr. Lutz discovered a species very similar to this (*Anopheles boliviensis* Theobald) on the slopes of the coast range at São Paulo, Brazil, while investigating an epidemic of malaria which had broken out among the thousands of laborers employed in the construction of a railroad line between São Paulo and Santos. Dr. Lutz took up his quarters in a house upon the mountain slopes in question and found that many species of biting insects entered in the evening when the inhabitants were seated around the lamp. Among these was a mosquito distinguishable by its spotted wings and the perpendicular position it assumed in biting. In spite of its small size it proved to be an exceedingly greedy blood-sucker and, without preliminary humming, pounced upon the persons present and a small dog. The bite of this species causes hardly any pain and sometimes does not even attract notice. In shady places in the forest and in cloudy weather this mosquito also bites in the daytime and in places may be troublesome in the hot hours of the day.

The larvæ were located in the water between the leaves of bromeliaceous plants, their body-color is red which appears in the form of small spots and becomes a livelier crimson as the larva grows older. Its form, as compared with the larvæ of other *Anopheles*, is broader and shorter and its breathing-tube is broader. It attains the usual length of 12 to 15 mm. The pupa is more diffusely yellowish-red with dark coloration upon the caudal paddles. The number of larvæ found in a plant varies but is never so large that it could be supposed that the female had deposited all her eggs there.

Lutz states that numerically *Anopheles boliviensis* furnished about one-fifth of the larvæ of all the bromelia-inhabiting species, about 40 in number. According to Peryassú the larva is predaceous.

Panama and northward to southern Mexico.

Caldera Island, Porto Bello Bay, Panama, January 20, 1908 (A. H. Jennings); Fort San Felipe, Porto Bello Bay, Panama, June 2, 1908 (A. H. Jennings); Estrella, Costa Rica, 2000 meters, September (C. Picado); Orosi, Costa Rica, 1100 meters, November to January (C. Picado); Córdoba, Mexico, December 23, 1907 (F. Knab).

Anopheles neivai is closely related to two other species, *A. boliviensis* and *A. bellator*, whose larvæ also inhabit the water held by Bromeliaceæ. It closely resembles these and differs most strikingly in having but two white spots on the costa while they have four. Our description is based upon two females from Panama.

A specimen of *A. boliviensis*, from São Paulo, Brazil, received through the kindness of Dr. Lutz, has the third vein white-scaled, only black near the base and tip. Theobald's description is silent upon this point, but Giles's description and figure show the middle third of this vein white-scaled. Specimens collected by Prof. C. H. T. Townsend on the eastern slopes of the Peruvian Andes agree in every respect with the Brazilian specimen. In our specimens of *A. neivai* the vein is entirely black-scaled, except immediately at its origin. Owing to the paucity of material before us, we were unable to judge of the range of variation in these species and so at first retained our specimens under the name *Anopheles cruzii* (=*A. boliviensis* Theobald). Dr. Arthur Neiva of Rio de Janeiro later made us a visit and after examining the specimens expressed the opinion that they are not the same as the Brazilian species with which he is familiar. He pointed out that it differs in larval as well as in imaginal characters. The larva of *Anopheles boliviensis*, according to the description and figures of Peryassú (Os Culicideos do Brazil, 1908, p. 328, pls. 1, 2), has seven pairs of stellate tufts on the abdomen and their single elements are lanceolate, sharply pointed; *A. neivai* has but six pairs of tufts and their elements are truncate; other minor differences exist. It gives us much pleasure to dedicate the species to Dr. Neiva, to whom we are much indebted for help and suggestions in the preparation of the general part of this work.

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ANOPHELES VESTITIPENNIS Dyar & Knab.

Anopheles vestitipennis Dyar & Knab, Proc. Biol. Soc. Wash., xix, 136, 1906.
Arribalzagia maculipes Pazos (not Theobald), San. y Ben., ii, 45, 180, 1909.
Anopheles vestitipennis Theobald, Mon. Culic., v, 601, 1910.

ORIGINAL DESCRIPTION OF ANOPHELES VESTITIPENNIS:

Tarsi banded with white, the hind tarsi black and white, both tarsi and femora speckled; wing veins black scaled with many little yellow patches.

23 specimens, Trece Aguas, Alta Vera Paz, Guatemala, April 7 to 14, 1906 (Schwarz and Barber); Polochic River, Guat., May 1, 1906 (Schwarz and Barber); Panzos, Guat., June, 1904 (O. F. Cook), March 23, 1906 (Schwarz and Barber); Nautla, Mexico (A. Dugès); Palizada, Mex. (A. Dugès); Cayamas, Cuba, May 22, "in the house" (E. A. Schwarz).

Type.—Cat. No. 9976, U. S. Nat. Mus.

DESCRIPTION OF FEMALE OF ANOPHELES VESTITIPENNIS (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderate, straight, uniform; labellæ long, lanceolate, with fine outstanding setæ; vestiture rough, black. Palpi nearly as long as the proboscis, uniform, roughened by long raised spatulate scales, black, a few whitish scales at bases of last two joints and at middle of long joint, some long setæ at tip. Antennæ filiform, the joints rather short, subequal, blackish, densely pilose; some white scales on the second joint; hairs of whorls sparse, black, short; tori subspherical, with an apical cup-shaped excavation, blackish-brown with a luteous rim, pruinose. Clypeus prominent, subtriangular, dark brown, nude. Eyes well separated on the vertex, black. Occiput with a median groove, brown, broadly and densely clothed with small, erect, forked black scales, a few white ones in the center of the vertex, some recumbent white scales along eye margins, extending forward medianly to anterior angles of eyes; a tuft of long white hairs inserted well forward between eyes; a row of black setæ along margins of eyes.

Prothoracic lobes rather large, lateral, densely clothed with erect truncate blackish scales. Mesonotum narrow, elongate, dark brown, slightly grayish pruinose, mottled with dark spots, two dorsal, narrow, bare, dark longitudinal stripes on anterior half, a broader bare dark stripe on each side of antescutellar space, extending over posterior two-thirds, with an indistinct black spot at its anterior end, an indistinct black spot beyond antescutellar space; vestiture of fine, moderately abundant, pale yellow hair-like scales arising from small black tubercles and series of short black hairs. Scutellum collar-like, dark brown, grayish pruinose, with a median black spot, clothed sparsely with yellow hair-like scales and coarse, long, dark brown marginal hairs. Postnotum elliptical, prominent, blackish-brown, nude. Pleuræ and coxæ blackish-brown with paler pruinose markings and a few small patches of ovate yellowish scales.

Abdomen subcylindrical, depressed, truncate at tip, brownish-black, clothed evenly with numerous fine brown hairs and longer black ones, particularly at the sides; tip densely hairy; cerci with small erect blackish-brown scales.

Wings (plate 41, fig. 3) moderate, hyaline; petiole of second marginal cell over half as long as its cell, that of second posterior cell longer than its cell; basal cross-vein distant about its own length from anterior cross-vein; outstanding scales of veins dense, narrowly ovate or sublanceolate, brownish-black, with ocher yellow scales in small spots as follows: a few minute ones on the costa, and two more conspicuous ones near its apex; six on first vein, the outer two opposite those on the costa; a small spot at furcation of second vein, none on its upper branch, two on lower branch; third vein with a small spot near base and slightly longer apical and subapical ones; fourth vein with two spots on the stem and two on each fork; fifth vein with two spots on the stem, three on upper fork and one long one on lower; sixth vein with five yellow spots. Halteres pale, with dark knobs.

Legs long and slender; vestiture black; femora and tibiæ with irregularly scattered little yellowish-white spots on the sides, more numerous on the fore legs; hind legs with about eight spots on femur and four on tibia towards base;

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front tarsi with the first joint with three little spots and base and tip yellowish, second and third joints yellowish at base and apex, fourth at base only; mid tarsi without rings, some minute white specks on the first joint; hind tarsi with the first, second, third, and fourth joints white-ringed at tips, first joint with four or five yellowish spots on basal third, one or two white rings beyond, second joint with a white ring above middle. Claw formula, 0.0–0.0–0.0.

Length: Body about 5 mm.; wing 4.5 mm.

Mr. McLachlan remarks: "These mosquitoes alight and rest on a surface with head down and body almost or quite at right angles with that surface. Legs bunched and extending straight up on line with the body." The larval habits and habitat are unknown.

Mexico and Central America; Greater Antilles.

Nautla, Mexico (A. Dugès); Palizada, Mexico (A. Dugès); Polochic River, Guatemala, June 2, 1907 (A. McLachlan); Panzos, Guatemala, June, 1904 (O. F. Cook); Cacao, Trece Aguas, Alta Vera Paz, Guatemala, April, 1906 (Schwarz & Barber); Cayamas, Cuba, May 22 (E. A. Schwarz); Spanish Town, Jamaica, January, 1910 (Dr. Neish, through M. Grabham).

Anopheles vestilipennis is very characteristic on account of its general dark appearance, enhanced by the heavy scaling of its wings, and the small size of the yellow spots on both wings and legs. It appears to be the commonest *Anopheles* in the forests of eastern Guatemala, but rare elsewhere.

ANOPHELES MACULIPES (Theobald) Knab.

Arribalzagia maculipes Theobald, Mon. Culic., iii, 81, 1903.
Arribalzagia maculipes Giles, Rev. Anophelinæ, 40, 1904.
Arribalzagia maculipes Lutz in Bourroul, Mosq. do Brasil, 36, 1904.
Arribalzagaia maculipes Blanchard, Les Moustiques, 624, 1905.
Arribalzagia maculipes Theobald, Mosq. or Culic. Jamaica, 13, 1905.
Arribalzagaia maculipes Peryassú, Os Culicid. do Brazil, 40, 106, 1908.
Arrizalzagia maculipes Prout, Ann. Trop. Med. & Paras., iii, 487, 1909.
Arribalzagia maculipes Theobald, Mon. Culic., v, 49, 1910.
Anopheles maculipes Knab, Amer. Journ. Trop. Dis. & Prev. Med., i, 36, 1913.

ORIGINAL DESCRIPTION OF ARRIBALZAGIA MACULIPES:

Thorax brown, with pale scales; palpi densely black scaled, with three narrow white bands and a minute white apex. Abdomen dark brown, the segments with lateral tufts of black scales. Legs dark brown, spotted with white, the hind tarsi with apical and basal white banding as well. Wings mostly dark scaled, with a few small yellow patches, costal border dark, with several small pale spots; three more or less pronounced dark patches on the costal border.

♀. Head dark brown, with deep brown and grey upright forked scales, the dark ones grey at the tips, a faint pale border round the eyes and a tuft of hair-like pale scales in front; antennae deep brown, basal joint black, with narrow curved white scales; clypeus brown, of peculiar form; palpi densely scaled with black scales, with three narrow white scaled bands, a white apex and a few scattered white scales; proboscis deep brown.

Thorax brown, with a slaty-grey sheen showing brown longitudinal lines and with small brown specks and narrow hair-like golden curved scales; there is a dark patch joining the scutellum which is carried on to its mid lobe, the rest of the scutellum being slaty-grey, with a few narrow hair-like golden scales; metanotum deep brown, with a median dark line; pleurae brown, with a grey sheen in places.

Abdomen black, with deep brown and golden-brown hairs, the dorsum nude, but each segment with an apical lateral tuft of black scales and a few white ones on the last few tufts; venter with many white and black flat scales, and also to some extent the apical segment. Legs deep brown, banded and spotted with white; fore legs missing; mid legs with the femora, tibiae, metatarsi and first tarsal with white spots, the second tarsal with a small median white spot, the apical tarsal faintly pale; hind legs with the femora, tibiae, and metatarsi banded and speckled with white and the tarsi with prominent white apical and basal bands.

Wings with thick lanceolate and clavate scales, mostly black, yellow patches as follows: ten small ones on the costa, the two apical ones only spreading as two small spots on to the first long vein; traces of one on the upper and two on the lower branches of the first fork-cell, one at the apex of the third and two on each branch of the second fork-cell; fringe brown, a pale spot where the lower branch of the fifth vein joins the border of the wing, another between the upper branch of

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the fifth and the lower branch of the fourth and between its upper branch and the third (remainder damaged); first sub-marginal cell longer and narrower than the second posterior cell, its base considerably nearer the base of the wing than that of the latter; mid-cross vein about its own length nearer the base of the wing than the supernumerary, the posterior not quite half its length distant from the mid; the supernumerary is just beneath the junction of the sub-costal and costal; the black wing scales from two pronounced black patches on the costa, and a third less prominent one may be noticed; haltered with bright brown stems and jet black knobs with some grey scales.

Length.—6.5 mm.

Habitat.—Sao Paulo, Brazil (Lutz); Trinidad (Urich).

Observations.—Described from a single ♀ sent me by Dr. Lutz as a new *Cycloleppteron* by mistake. It is a very marked and beautiful species, with much banded and speckled mid and hind legs. The wings are very dark, and the large number of minute yellow costal spots is very characteristic.

I cannot make out the structure of the clypeus with any degree of certainty, but from what I can see in this single specimen it is of very peculiar form.

It bears a general resemblance to *Cycloleppteron mediopunctatus*, but can be told by the absence of inflated wing scales and the different positions of the cross-veins and fork-cells. It stings after sunset, and is most common in the littoral. It is almost certainly a malaria bearer, writes Dr. Lutz. A specimen was sent also whilst this volume was in the press from Trinidad, and others from Brazil.

DESCRIPTION OF FEMALE OF ANOPHELES MACULIPES (MALE UNKNOWN):

Female.—Proboscis moderate, straight, uniform; labellæ long, lanceolate, with fine outstanding setæ; vestiture black, roughened toward base. Palpi as long as the proboscis, uniform, clothed with roughened, erect, long spatulate scales, black, white ones irregularly intermixed, rings of white scales at bases of last two joints and at middle of long joint. Antennæ filiform, the joints subequal, pale, black and slightly thickened at base, densely pilose; hairs of whorls sparse, short, black; tori subspherical, with a cup-shaped apical excavation, blackish brown, pruinose, with ovate white scales on outer side. Clypeus broad, rounded triangular, blackish, pruinose, nude. Eyes narrowly separated on the vertex, black. Occiput blackish, densely clothed with erect, rather broad, truncate black scales, some pale ones anteriorly toward the center, a row of recumbent, lanceolate white scales along eye-margins, a group of long yellowish white hairs projecting forward between the eyes; hairs along eye-margins coarse, black.

Prothoracic lobes small, clothed with erect, spatulate black scales above, smaller white scales below, and with a few coarse black bristles. Mesonotum narrow, elongate, brownish gray pruinose, irregularly mottled with deep brown dots, a pair of indistinct, narrow longitudinal bare stripes on anterior half of disk, a pair of broader bare stripes well outward on posterior half, a black spot at their anterior ends near lateral angles, a large black spot basally on antescutellar area; vestiture of fine pale yellow hairs arising from small black punctures, some long narrow white scales intergrading with the hairs along the margin anteriorly. Scutellum collar-like, gray pruinose, with a large black spot in the middle continuous with that on mesonotum, clothed with pale hairs and brown marginal bristles. Postnotum elliptical, prominent, reddish brown, nude. Pleuræ and coxæ pale grayish pruinose, with large blackish spots, fine hairs and small patches of white scales.

Abdomen subcylindrical, depressed, truncate at tip, brownish black, dorsally clothed rather evenly with scattered fine pale yellow hairs, a series of tufts of outstanding black spatulate scales at apical angles of segments; a few scattered pale scales on disk of seventh and eighth segments, the latter with a median apical tuft of broad yellowish white scales; venter with large broad white scales, particularly along lateral margins.

Wings moderate, hyaline; second marginal cell much longer than its petiole, second posterior cell hardly longer than its petiole; basal cross-vein about its own length from anterior cross-vein; outstanding scales of veins narrowly ovate to lanceolate, predominatingly black and with small patches of white ones; several large black spots along the costa, formed by the massing of black scales, one at basal third involving subcostal and first veins, a larger semicircular one

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just before middle involving base of second vein, toward apex a still larger spot involving first vein and both branches of second, separated from a small subapical and larger apical spot by streaks of white scales; outside of these spots the veins are irregularly mottled with white, the white in small spots distributed as follows: three on stem of second vein, the third one at base of fork, each branch with a spot toward apex; third vein with a spot near base and another toward apex; fourth vein with several spots on the stem and two on each fork; upper fork of fifth vein with three spots; sixth vein with five spots; the outermost spots on veins 2, 3 and 4 form the outer limit of the largest black scale-patch. Halteres pale, covered with small white scales, the disk of knob black and bare.

Legs long and slender, black, marked with yellowish white; femora, tibiæ and first joint of tarsi with a series of small yellowish white rings and spots, the femora pale beneath to near apices; knees and tips of tibiæ yellowish white; front tarsi with basal and apical rings on the four proximal joints, the fifth wholly black-scaled; mid tarsi similarly ornamented, the rings much narrower; hind tarsi with narrow apical rings on the four proximal joints, the last joint wholly black. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 4 mm.

The larva is unknown to us. We quote the following description from Doctor Peryassú's work (Os Culic. do Brazil, 332, 1908):

"The larva is dark-colored with the third and eighth abdominal segments yellowish white.

"Head rounded. Antennae long, conical, with two very long terminal spines, with slender point; on the internal part are two spines and a tuft formed of hairs and at the extremity a long hair. Labial plate triangular. Mouth brushes dense and formed of hairs of ordinary length. Neck with a black rim at the posterior opening. Thorax yellowish white in front, with long branched setæ.

"Abdomen with the segments large and detached, dark brownish in color; except the third and eighth which are yellowish white. The setæ of the three first segments are long and branched (like a palm-leaf), those of the other segments are short but also branched. Anal siphon with a large tuft composed of long hairs, similar to what is observed in *Chagasia fajardoi*. Anal leaflets short and with the apices rounded."

The hair-tuft in *C. fijardoi* arises from the median anterior margin of the air-tube, almost between the pair of spiracles.

Peryassú dissected 153 mature eggs from a female; he gives the following descriptive notes on the eggs (*l. c.* 331–332):

"The eggs are deposited singly in small numbers and do not form characteristic groups. Eggs were mailed from Xerém to Manguinhos, May 20 '07, placed in water May 22 '07 and hatched three days later. The eggs are very resistant to desiccation.

"The eggs are of elongate ellipsoidal form with the two poles greatly rounded.

"Length .48 mm.; diameter .17 mm.

"When laid they are pearl-white, later grey and dark grey. They are completely covered with white air-tubes arranged perpendicularly to the body of the egg, forming salient margins broader in the median part. At each of the poles there is a small crown composed of tubes like the others but smaller.

"When hatching they split open longitudinally."

Forested regions of South America and island of Trinidad.

Chaquanas, Trinidad, March, 1914 (I. F. Lasalle); Itaguahy, State of Rio de Janeiro, Brazil (Inst. Oswaldo Cruz). Reported also from São Paulo, Brazil (Theobald), States of Minas Geraes and Rio de Janeiro, Brazil (Peryassú); Jamaica (Theobald).

We have a single specimen of *Anopheles maculipes* from Trinidad, where it is evidently rare, and another from Brazil, this latter through the kindness of the Instituto Oswaldo Cruz. From these specimens it appears that the species is easily distinguishable from the similarly ornamented species occurring within

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our region by the fact that the terminal rings of the hind tarsal joints are apical only and the last joint wholly black. The wing ornamentation is also characteristic, the third vein being almost wholly black-scaled and the black scales more extensive throughout. There appear to be no pigment spots underneath the three large costal patches of black scales and the light colored scales are white throughout, while in some of the related species they are predominatingly yellow except in the costal region. It should be kept in mind, however, that the extent of the black in the wing-pattern is subject to considerable variation in all the species of this group.

We are particularly sceptical of the record by Theobald (and quoted by Prout) for Jamaica and convinced that some error has been made. We are not sure that the description and figure of the wing given in that connection (Mosq. or Culic. of Jamaica, p. 13, pl. 1, fig. 1, 1905) were made from a Jamaican specimen. The distribution of the black scales as shown in that figure does not agree with the figure previously published by Theobald (Mon. Culic., iii, p. 83, fig. 51*a*) nor with the specimens before us.

ANOPHELES MEDIOPUNCTATUS (Theobald) Dyar & Knab.

Cycloleppteron mediopunctatus Theobald, Journ. Trop. Med., v, 182, 1902 (nomen nudum).
Cycloleppteron mediopunctatus Theobald, Mon. Culic., iii, 60, 83, 1903.
Cycloleppteron mediopunctatum Giles, Revis. Anophelinæ, 14, 26, 1904.
Cycloleppidopteron mediopunctatum Lutz in Bourroul, Mosq. do Brasil, 36, 75, 78, 1904.
Cycloleppidopteron mediopunctatum Blanchard, Les Moustiques, 623, 1905.
Cycloleppteron mediopunctatus Theobald, Gen. Ins., Dipt., 26 fasc., 8, 1905.
Cycloleppteron mediopunctata Theobald, Mon. Culic., iv, 54, 1907.
Cycloleppteron medio-puntatum Peryassú, Os Culicid. do Brazil, 39, 80, 1908.
Cycloleppteron mediopunctatum Neiva, Mem. Inst. O. Cruz, i, 69, 1909.
Cycloleppteron mediopunctatus Theobald, Mon. Culic., v, 34, 1910.
Anopheles mediopunctata Howard, Dyar & Knab, Mosq. No. & Centr. Amer. & W. Ind., ii, pl. 41, fig. 17, 1913.
Anopheles mediopunctatum Knab, Amer. Journ. Trop. Dis. & Prev. Med., i, 35, 1913.

ORIGINAL DESCRIPTION OF CYCLOLEPPTERON MEDIOPUNCTATUS:

Thorax reddish-brown, with a grey sheen, with two black eye-like spots and a large dark spot in front of and extending on to the scutellum, the mesothorax spotted with deep reddish-brown and with pale scales. Abdomen deep brown, with golden hairs and lateral scale tufts. Palpi banded with black and gold. Legs deep brown, spotted and banded with golden yellow, the last tarsal segment of all the legs yellow. Wings with black and white scales, the black forming three prominent costal spots on tinged ground, several small white costal spots.

♂. Head deep brown, with very short creamy upright forked scales in the middle, the edge of the eyes grey towards the middle of the head, brown laterally, two large tufts of long golden hairs projecting forwards. Antennae banded with pale brown and grey, with flaxen brown plumes; palpi with the two apical joints swollen, golden yellow with narrow basal black bands, the rest of the palpi black, with patches of golden scales, especially towards the base, where the scales become dense, hair tufts golden and flaxen, with shades of brown; proboscis brown, thin curved downwards.

Thorax pale reddish-brown, with a greyish sheen, rather large deep reddish-brown spots in the middle and broad line of smaller ones on each side, about the middle of the mesonotum on each side a prominent black eye-like spot and another larger one at the back of the mesonotum extending over the middle of the scutellum, thorax clothed with scattered golden hair-like curved scales and a few rather flat white ones over the roots of the wings; metanotum pale brown; pleurae brown, with two grey curious twisted marks.

Abdomen deep blackish-brown, with golden hairs, each segment with apical lateral tufts of black and golden scales and ventral scales, especially on the apical segments.

Legs deep brown, spotted and banded with rich golden yellow, the spotting most pronounced on the femora and tibiae, the banding on the metatarsi and tarsi, on the former irregular, on the latter broad and more pronounced, but also showing spotting on the dark areas; last segment of all the legs yellow.

Wings with black and white scales and with the membrane with three brown patches on the costal border. The black scales form three prominent large costal spots over the tinged areas; the remaining dark costal border is broken by about ten small white spots, of which there are several also on the first long vein. The first

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fork-cell has its branches thickly clothed with pale small brown and grey scales in patches and with a few black *Cycloleppteron* scales at its base, so also has the greater part of the third vein and the branches of the second fork-cell, the stems of the fork-cells and basal portions of the other veins with scattered black inflated scales; the sixth has grey scales, especially along its basal half, and three small spots of inflated black ones; fringe pale, apparently unspotted; halteres large, fuscous.

Length.—5 mm.

Habitat.—Brazil (Dr. Lutz).

Observations.—Described from a perfect ♂. It is the most beautiful *Anopheles* I have seen. Together with this ♂, Dr. Lutz sent me a preparation of the ♀ wing. This shows typical *Cycloleppteron* scales. Later he sent me several ♀'s, which he came to the conclusion were the ♀'s of the male here described, and mentions that the ♀ wing sent was that of a male *O. mediopunctatus*. These ♀'s presented no *Cycloleppteron* characters, and moreover are black and silvery grey, not the brilliant golden hue seen in the male *Cycloleppteron*. The ♀ of *O. Grabhamii* has true *Cycloleppteron* scales, but the ♀'s sent by Lutz have none whatever; in fact, I feel certain that they are not the ♀'s of this species, but quite distinct, although they have assumed the general appearance of the *Cycloleppteron*. Moreover, the wing sent me as that of a ♀ certainly differs from the ♂'s I have examined, and I venture to think Dr. Lutz was correct in his first surmise, the difference being noticeable in the relative positions of the fork-cells, and, to some extent, the cross-veins, which, however, may be variable.

DESCRIPTION OF FEMALE OF ANOPHELES MEDIOPUNCTATUS (LARVA UNKNOWN):

Female.—Proboscis moderate, straight, enlarged toward base; labellæ long, lanceolate, with fine outstanding setæ; vestiture black, roughened basally. Palpi as long as the proboscis, uniform, roughened by long erect spatulate scales, black intermixed with a few white ones. Antennæ filiform, the joints subequal, rather short, pale, blackish at bases, densely pilose; hairs of whorls sparse, black, rather short; tori small, subspherical, with an apical cup-shaped excavation, brown, with a luteous spot and a patch of yellowish scales. Clypeus large and broad, rounded triangular, brown, nude. Eyes narrowly separated on the vertex, black. Occiput with a median groove, brown, densely clothed with erect truncate black scales, a few white ones in the center of the vertex, a tuft of long white hairs projecting forward between eyes; a row of long black setæ along margins of eyes.

Prothoracic lobes small, lateral. Mesonotum narrow, elongate, light pinkish-gray, pruinose, irregularly mottled with deep brown dots, heaviest along median line, two narrow impressed concolorous longitudinal stripes on anterior half of disk, a round black spot medianly on each side well towards lateral margins, a large black spot on antescutellar space; vestiture of scattered pale yellow hair-like scales and fine pale hairs, some semi-erect whitish ovate scales on anterior margin and along sides of disk. Scutellum collar-like, grayish, with a large black spot in the middle, contiguous with that on antescutelllar space, clothed with pale fine hairs and coarse brown marginal bristles. Postnotum elliptical, prominent, pale brown, pruinose, nude. Pleuræ and coxæ pale grayish-pruinose, with large dark brown spots; hairs pale; coxæ with patches of erect ovate white scales.

Abdomen subcylindrical, depressed, truncate at tip, black, dorsally gray-pruinose, evenly clothed with numerous fine pale hairs, intermixed with a few broadly triangular white scales posteriorly; venter with many similar white scales and the apices of the segments with bands of broad, erect black scales forming outstanding tufts on the posterior angles of the segments. Cerci clothed with similar scales.

Wings (plate 41, fig. 17) moderate, hyaline, pigmented with brown on three costal spots and a small one at cross-veins; petiole of second marginal cell nearly as long as its cell, that of second posterior cell about as long as its cell; basal cross-vein distant about its own length from anterior cross-vein; outstanding scales of veins broadly elliptical, partly almost circular, black and white intermixed, with black ones in spots as follows; three large spots on the costa involving subcostal, first and second veins, a small apical one at end of second marginal cell, small spots at base of third vein, base of fork of fourth and at basal cross-

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vein, on fifth vein near base and on its upper fork at basal cross-vein, on sixth vein beyond middle and at tip. Halteres pale, with large white and black scaled knobs.

Legs long and slender, scaled with brownish-black and pale yellow, the colors nearly evenly intermixed on the femora and tibiæ, the yellow predominating on the tarsi, which appear yellow with numerous small brown specks; hind tarsi with about eight brown rings or spots on the first joint, four on the second, three on the third, two on the fourth, none on the fifth. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 4 mm.

There are no specimens of the male in the U. S. National Museum.

Life history and habits unknown.

Tropical South America.

Trinidad, West Indies (F. W. Urich); Rio Xerém, State of Rio de Janeiro, Brazil, June 27, 1907 (Instituto Oswaldo Cruz). Reported also from States of Amazonas, Bahia and São Paulo, Brazil (Lutz); Tartaria, State of Minas Geraes, Cities of São Paulo, Santos and Taubaté, State of São Paulo, and many localities in the State of Rio de Janeiro, Brazil (Peryassú).

We possess but a single specimen of this species from the region under consideration. It belongs to the South American fauna, but, as it occurs in Trinidad, we are enabled to include it. Coquillett proposed the genus *Nototricha*, with this species as the type. The specimens before him, however, were wrongly identified, and are in reality *Anopheles strigimacula*. In determining a generic type, we consider that the question of identification should not be raised. We therefore cite *mediopunctatus* as the type of *Nototricha*, as that species is specified as the type, but quote the reference of *Nototricha mediopunctatus* Coquillett (not Theobald) in the synonymy of *Anopheles strigimacula*, from which species the characters of the genus were in fact taken. The larva referred to as *Anopheles mediopunctatus* by Dyar & Knab is really that of *Anopheles strigimacula*, under which name the reference will be found. Our specimen from Trinidad agrees in every respect with one from Brazil.

ANOPHELES APICIMACULA Dyar & Knab.

Anopheles maculipes Dyar & Knab (not Theobald), Journ. N. Y. Ent. Soc., xiv, 176, 1906.

Cellia maculipes Coquillett (not Theobald), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 13, 1906.

Anopheles apicimacula Dyar & Knab, Proc. Biol. Soc. Wash., xix, 136, 1906.

Anopheles punctimacula Dyar & Knab, Proc. Biol. Soc. Wash., xix, 136, 1906.

Anopheles apicimacula and *punctimacula* Busck, Smiths. Misc. Colls., quart. iss., iii, 59, 1908.

Anopheles apicimacula Theobald, Mon. Culic., v, 601, 1910.

Anopheles punctimacula Theobald, Mon. Culic., v, 602, 1912.

Anopheles apicimacula and *punctimacula* Darling, Stud. Rel. Malaria, Isthm. Canal Comm., 10, 1910.

Anopheles apicimacula and *punctimacula* Jennings, Journ. Econ. Ent., v, 134, 1912.

Anopheles apicimacula and *punctimacula* Knab, Amer. Journ. Trop. Dis. & Prev. Med., i, 35, 36, 1913.

Anopheles apicimacula and *punctimacula* Howard, Dyar & Knab, Mosq. No. & Centr. Amer. & W. Ind., ii, pl. 41, figs. 4, 5, 1913.

ORIGINAL DESCRIPTION OF ANOPHELES APICIMACULA:

As in *A. strigimacula* D. & K., but with a distinct black costo-apical spot on wing.

26 specimens, Livingston, Guatemala, May 11, 1906 (H. S. Barber); Cordoba, Mexico (F. Knab); Colon Panama (A. I. Kendall); Trinidad, B. W. I. (F. W. Urich).

Type.—Cat. No. 9978, U. S. Nat. Mus.

ORIGINAL DESCRIPTION OF ANOPHELES PUNCTIMACULA:

As in *A. strigimacula* D. & K., but the last vein with a row of black dots.

One specimen, Colon, Panama, February 2, 1904 (W. M. Black).

Type.—Cat. No. 9979, U. S. Nat. Mus.

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DESCRIPTION OF FEMALE, MALE, AND LARVA OF ANOPHELES APICIMACULA:

Female.—Proboscis moderate, straight, uniform; labellæ long, lanceolate, with fine outstanding setæ; vestiture black, somewhat roughened at base. Palpi as long as the proboscis, uniform, roughened by long erect spatulate scales, black, narrow white rings at bases of last two joints and middle of long joint, a group of light hairs at tip. Antennæ filiform, the joints subequal, rather short, blackish, densely pilose; hairs of whorls sparse, black, short; tori rather small, subspherical, with an apical cup-shaped excavation, piceous, with a luteous rim and a patch of ovate yellowish-white scales. Clypeus broad, rounded triangular, dull brown, pruinose, nude. Eyes narrowly separated on the vertex, black. Occiput with a median groove, piceous, broadly and densely clothed with erect truncate black scales, a few white ones in the center of the vertex; a group of long pale hairs projecting forward on the vertex and between the eyes; hairs along eye-margins long and black.

Prothoracic lobes small, lateral. Mesonotum narrow, elongate, grayish pruinose, irregularly mottled with deep brown specks, two indistinct, narrow, impressed, concolorous longitudinal stripes on anterior two-thirds of disk, a pair of broader bare stripes well towards the sides on posterior third, a large subquadrate black spot on each side near lateral angle and one basally on antescutellar space; dorsal vestiture of fine pale golden hairs in longitudinal series and arising from black punctures, a few narrow erect white scales at anterior margin. Scutellum collar-like, brownish, gray pruinose, with a large black spot in middle continuous with that on antescutellar space, with pale hairs and coarser brown marginal bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ and coxæ grey pruinose, with dark brown bare spots, fine yellowish hairs, and some small patches of ovate whitish scales.

Abdomen subcylindrical, depressed, truncate at tip, luteous-brown, the segments darker on the disk, clothed dorsally rather evenly with numerous fine pale yellow hairs, a conspicuous tuft of erect spatulate black scales on posterior angles of each segment; venter with a few triangular white scales and erect black scales at apices of segments forming broad apical bands.

Wings (plate 41, figs. 4, 5) moderate, hyaline, three brown spots on the costa and smaller ones about the cross-veins; petiole of second marginal cell over half as long as its cell, that of second posterior cell longer than its cell; basal cross-vein distant about its own length from anterior cross-vein; outstanding scales of veins ovate, black and yellowish-white, with black scales in spots as follows: three very large ones on the costa involving subcostal, first and second veins, the membrane strongly infuscated beneath the black scales, a fourth large spot apical, involving apices of first and second veins; on the costa preceding and between the large spots are small spots; several little spots on first vein between the large spots; four small spots on third vein, the largest one basal, two beyond middle and a minute apical one; fourth vein black with several white spots on the stem, two white ones on upper fork and one long one on lower; fifth vein black scaled, upper fork with three little white spots, lower with one spot near tip; sixth vein black scaled, with five white spots; fringe dusky, with a large yellow spot at tip of wing and small ones at apices of some of the veins. Halteres pale at base, white scaled, disk of knob black.

Legs long and slender, black-scaled with numerous yellowish white spots and rings, about eight on the femora, about ten on the tibiæ; hind tarsi with seven or more small yellowish white spots on the first joint, base, apex, and a middle spot white on second and third joints, fourth and fifth joints narrowly white at base and apex; fore tarsi with three white spots on first joint, second, third, and fourth joints white at base, the second also with a white ring at middle, fifth joint pale at tip; mid tarsi without marks. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 4 mm.

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Male.—Proboscis rather slender, uniform, straight, black-scaled. Palpi about as long as the proboscis, the last two joints swollen, forming a distinct club and with long, dense, black hairs; vestiture black, last joint white at tip, last two white-ringed at base and with some scattered white scales, a narrow white ring at middle of long joint. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, about three times as long as wide, pale, with black rings at insertions of hair-whorls; hairs of whorls long, dense, black. Coloration as in the female. Abdomen elongate, depressed, parallel-sided; lateral ciliation of long, coarse, irregular brownish hairs. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture more sparse. Claw formula, 2–0.0.–0.0–0.0.

Length: About 3.5 mm.; wing 3 mm.

Genitalia (plate 39, fig. 261): Side-pieces about twice as long as wide, tips conically rounded; two stout setæ close to the base, another at middle of inner margin; clasp-filament long and slender, medianly slightly attenuated, with a small articulated terminal claw. Basal appendages large, leaf-like. Unci columnar, bearing several spatulate appendages at tip.

Larva, Stage IV.—Head rounded, longer than wide, bulging at the sides, front conically produced; dorsal head-hairs single, but numerously branched, in a line between antennæ, a smaller hair at base of antenna; two long approximated spines on front margin (antennæ wanting). Eyes large, pointed. Mental plate small, with a median tooth and four on each side, the first two evenly spaced, the third remote, the fourth small. Mandible elliptical, truncate on front margin; a row of long hairs on outer base; four filaments before tip with a tuft of little hairs; a row of cilia from a collar; five feathered filaments on outer margin; dentition large, two small teeth, a large slightly notched one and two more small teeth followed by a square process composed of confluent spines; a row of long hairs at the basal articulation. Maxilla transversely quadrangular, triangularly excavate centrally, the excavation lined with cilia, which also fringe the straight outer margin and become longer on the inner angle; two little filaments in the excavation; palpus large, only slightly articulated to maxilla, exceeding it both basally and distally; three spines and two spatulate appendages at tip; an outer dendritic tuft (lost). Thorax subquadrate, about as long as wide; hairs short, consisting of branched hairs, single hairs and tufts; mesothorax sparsely haired. Abdomen stout, anterior segments shorter; long feathered lateral hairs on first three segments, double on first and second, single on third; posterior hairs small, smooth; a dorsal series of five pairs of fan-shaped tufts on third to seventh segments. Air-tube sessile, subquadrate, roundedly angled posteriorly. Lateral plates of the eighth segment posteriorly with a series of spines, five very long ones and nine short ones, about one-third as long as the long ones and irregularly alternating with them. Anal segment about as long as wide, with a small dorsal plate; dorsal brush a long and a short tuft on each side; a single long lateral hair below the plate; ventral brush well developed, of long branched tufts; anal gills moderate, bluntly pointed.

Mr. Knab bred a single specimen from a pool in a stream-bed, associated with *Anopheles strigimacula* and *Culex derivator;* Mr. Jennings found larvæ in a water course.

Tropical American mainland.

Córdoba, Mexico, June 13, 1905 (F. Knab); Livingston, Guatemala, May 11, 1906 (H. S. Barber); Bluefields, Nicaragua (W. F. Thornton); Colon, Panama (A. I. Kendall, W. M. Black); Tabernilla, Canal Zone, Panama (A. Busck); Caldera Island, Porto Bello Bay, Panama, January 21, 1908 (A. H. Jennings); Cucaracha, Canal Zone, Panama, May 14, 1908 (A. H. Jennings); Las Cascadas, Canal Zone, Panama, February 5, 1908 (R. L. Turner); East La Boca, Canal Zone, Panama, November 28, 1908 (A. H. Jennings); Trinidad, West Indies (F. W. Urich).

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Anopheles apicimacula is one of a group of closely similar species, which agree in the wing-pattern, the presence of abdominal lateral scale-tufts, and in having mottled legs. It is distinguishable from *mediopunctatus* and *malefactor* by the more narrowly ovate wing-scales, agreeing in this respect with *strigimacula* and *maculipes*. The last named differs by having the rings on the hind tarsi at the apices of the joints, while the others have them at both ends of the joints. The most obvious difference between *apicimacula* and *strigimacula* is that in the former the rings of the hind tarsi are white and rather scattered, while in the latter they are yellow and very numerous. There is considerable variation in the extent of the light scaling, both on the wings and tarsi. The third vein usually bears only two black spots, one near base, the other near apex; but some of our specimens show additional spots. The spots on the sixth vein are very variable in number and extent. The last hind tarsal may be either wholly white, or with a black ring.

We have sunk *Anopheles punctimacula* as a synonym of *apicimacula*, further study having convinced us that the differences on which the species was based, the less concrete black apical wing-spot and the wholly white last joint of the hind tarsi, are not specific.

ANOPHELES STRIGIMACULA Dyar and Knab.

Anopheles mediopunctatus Dyar & Knab (not Theobald), Journ. N. Y. Ent. Soc., xiv, 176, 1906.
Nototricha mediopunctatus Coquillett (not Theobald), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 13, 1906.
Anopheles strigimacula Dyar & Knab, Proc. Biol. Soc. Wash., xix, 136, 1906.
Anopheles strigimacula Theobald, Mon. Culic., v, 601, 1910.
Anopheles strigimacula Darling, Stud. Rel. Malaria, Isthm. Canal Comm., 10, 1910.

ORIGINAL DESCRIPTION OF ANOPHELES STRIGIMACULA:

Tarsi banded with white, the hind tarsi black and white, both tarsi and femora speckled; wing veins white with black dots and spots; third vein with a small black dot at base or beyond; wing scales narrow; tarsi black and white, not yellow; no distinct costo-apical black spot on wing; last vein with three black dashes.

One specimen, Cordoba, Mexico (F. Knab).

Type.—Cat. No. 9977, U. S. Nat. Mus.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF ANOPHELES STRIGIMACULA:

Female.—Proboscis moderate, straight, uniform; labellæ long, lanceolate, with fine outstanding setæ; vestiture black, roughened toward base. Palpi as long as the proboscis, uniform, roughened by long, erect, spatulate scales, black, a few whitish scales at apex, at bases of last two joints and at middle of long joint. Antennæ filiform, the joints subequal, pale, with black basal rings, densely pilose; hairs of whorls sparse, pale, short; tori small, subspherical, with an apical cup-shaped excavation, brown, with a luteous rim and a patch of ovate white scales on outer side. Clypeus broad, rounded triangular, brown, pruinose, nude. Eyes well separated on the vertex, black. Occiput with a median groove, blackish, clothed with erect, truncate black scales, a group of white ones in the center of the vertex, a row of recumbent white scales along eye-margins to their anterior angles, a group of long pale hairs projecting forward from interocular area; hairs along eye margins long, black.

Prothoracic lobes small, lateral, clothed with erect spatulate black scales. Mesonotum narrow, elongate, pale grayish-pruinose, irregularly mottled with deep brown dots; a pair of indistinct, narrow, longitudinal bare lines on anterior half of disk; a pair of broader bare stripes well outward on posterior half, a large black spot at their anterior ends near lateral angles, a larger black spot basally on antescutellar space; vestiture of fine pale yellow hairs arising from small black punctures, some long, narrow pale scales intergrading with the hairs near anterior margin, a few erect, spatulate black scales at anterior angles; bristles over roots of wings short, pale yellow. Scutellum collar-like, grayish pruinose, with a large black spot in the middle continuous with that on mesonotum, clothed with pale hairs and brown marginal bristles. Postnotum ellip-

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tical, prominent, dark brown, nude. Pleuræ and coxæ pale grayish pruinose with large blackish spots, fine hairs, and small patches of white scales.

Abdomen subcylindrical, depressed, truncate at tip, brownish-black, dorsally clothed rather evenly with scattered fine pale hairs, a series of conspicuous tufts of black spatulate outstanding scales at posterior angles of segments; venter with scattered broad white scales and outstanding black ones at apices of segments.

Wings (plate 41, fig. 11) moderate, hyaline, with three brown pigment-spots along costa; petiole of second marginal cell shorter than its cell, that of second posterior cell slightly longer than its cell; basal cross-vein distant about its own length from anterior cross-vein; outstanding scales of veins narrowly ovate, pale yellow, with black scales in spots as follows: three large costal spots, the membrane beneath infuscated, the first smallest, involving subcostal and first veins, the others very large, involving also the second vein, the outer one both branches of its fork; no concrete apical spot; costa and first vein with black spots and dashes between each of the large spots; second vein mostly dark scaled, each fork with two little yellow spots; third vein with five black spots, the first at base, the last at tip; fourth vein black scaled with small yellow spots, three small yellow spots on upper branch and one long one on middle of lower branch; fifth vein with some black scales near base, five spots on upper fork, two on lower; sixth vein with six irregular spots of black scales, the last at the tip. Halteres pale at base, covered with small white scales, disk of knob black and bare.

Legs long and slender, black speckled with yellowish-white; hind femora with about ten spots or rings; hind tibia with about fourteen; hind tarsi with about ten yellow spots on the first joint which is entirely yellow beneath, second joint yellow at base and tip and spotted beyond middle, third and fourth joints yellow at bases and tips and with a ring beyond middle, fifth all yellow; front tarsi with narrow yellow rings at bases and apices of joints, the last entirely pale; mid tarsi not distinctly ringed. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis straight, uniform, black-scaled. Palpi about as long as the proboscis, the last two joints swollen, forming a distinct club, and with long, dense yellowish hairs; vestiture black, last two joints golden yellow scaled above, a black ring at articulation, a broad yellow ring at middle of long joint. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others rather short, subequal, slender, pale, with dark rings at insertions of hair-whorls; hairs of whorls long, dense, brown with yellow luster. Coloration as in the female. Abdomen more elongate and slender than in the female, depressed, some flat, light yellowish scales dorsally on the last two segments; claspers with outstanding black scales. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture more sparse. Claw formula, 2–0.0–0.0.

Length: Body about 4.5 mm.; wing 4 mm.

Genitalia (plate 39, fig. 260): Side-pieces hardly twice as long as wide, the tips conically rounded; a stout seta on the inner margin and two separated ones at the bases. Basal appendages leaf-like. Unci with long spatulate terminal appendages. Clasp-filament long, rather stout, slightly attenuated mesially, with a minute terminal claw.

Larva, Stage IV.—Head rounded, elongate, longer than wide, bulging at the sides, front conically produced; both pairs of dorsal head-hairs single but numerously branched, in a line between the antennæ, a smaller hair at base of antenna; two long approximate spines on front margin. Antennæ subcylindrical, slightly enlarged near base, very weakly spined; a dendritic tuft near basal third; two long spines at tip, a slender tuft and a short digit. Eyes large, pointed. Mental plate small, with a central tooth and five on each side, the first two rounded and approximate, the third and fourth remote, the fifth small. Mandible quadrangular, rounded; four feathered filaments near base and two

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beyond them; a group of four filaments before tip; an outer row of cilia; six serrate filaments on outer margin; dentition of two small teeth followed by a large one which is roundedly serrate on its lower declivity; a long row of confluent spines; two broad serrate filaments within; basal angle rounded, with a small tuft; a row of long basal hairs. Maxilla narrowly quadrangular, slightly excavate on outer margin; all the margin and inner area densely hairy; a pair of small filaments on inner third; palpus rather large, conical, a large dendritic tuft without, a terminal group of digits and flattened appendages. Thorax subquadrate, about as wide as long; hairs short, consisting of branched hairs, single hairs and tufts; metathorax sparsely haired. Abdomen stout, the anterior segments shorter; long feathered lateral hairs on first three segments, double on first and second, single on third; posterior hairs small, smooth; a dorsal series of five pairs of fan-shaped tufts on third to seventh segments (plate 130, fig. 456). Air-tube sessile, subquadrate, roundedly angled posteriorly. Lateral plates of eighth segment with a series of spines posteriorly, seven or eight long ones alternating with six or seven short ones which are about one-fourth as long as the long ones. Anal segment about as long as wide, with a small dorsal plate; dorsal brush a long hair and a short tuft on each side; a single long lateral hair below the plate; ventral brush well developed, of long branched tufts; anal gills moderate, about as long as the segment, bluntly pointed.

Mr. Knab found the larvæ in pools in a river-bed in a deep ravine. The water was clear and surrounded by large boulders. They were associated with *Culex pinarocampa, Culex derivator,* and *Aëdes cuneatus.*

Tropical Mexico.

Córdoba, June 13, 1905, and January 22, 1908 (F. Knab).

ANOPHELES MALEFACTOR Dyar & Knab.

Anopheles malefactor Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 198, 1907.
Anopheles malefactor Busck, Smiths. Misc. Colls., quart. iss., iii, 59, 1908.
Anopheles malefactor Theobald, Mon. Culic., v, 87, 1910.
Anopheles malefactor Darling, Stud. Rel. Malaria, Isthm. Canal Comm., 9, 1910.
Anopheles malefactor Jennings, Journ. Econ. Ent., v, 134, 1912.
Anopheles malefactor Knab, Amer. Journ. Trop. Dis. & Prev. Med., i, 36, 41, 1913.

ORIGINAL DESCRIPTION OF ANOPHELES MALEFACTOR:

♀.—Palpi long, clothed with brown scales and black outstanding ones, which are grouped more or less in tufts, heaviest on the basal portion, a slight sprinkling of lighter scales among the brown ones, particularly at the bases of the dark tufts; occiput black-scaled, the eyes margined with white above and where they join is a tuft of white hairs; mesonotum gray with reddish and bluish tinge and small dark freckles tending to form longitudinal rows, sparsely distributed narrow yellowish scales, a black spot at the base extending over the middle of the scutellum and two small sub-lateral black spots medially, all three of these show a lighter margin; abdomen slender, gray, with lateral tufts of outstanding black scales at the apices of the segments; legs with the femora and tibiæ black freckled with white, on the hind tibiæ yellow scales predominate; tarsi black, ringed with yellowish white; on the hind legs the first tarsal joint is dark at the base, light at the apex and has six white rings of different lengths, second joint narrowly white at base, broadly so at apex, with a moderately broad white ring near the middle and another narrower one between it and the base, third and fourth joints white ringed at base and apex with a broad central white ring, apical segment entirely whitish scaled; wing spotted, black and white, a large black patch margined with white on the costa near the middle, more basally a smaller costal patch and towards the apex another large one, all margined with white, scaling of the veins in patches of black and white scales, the third vein with a small, black spot at the base, the sixth vein with many black dots and dashes. Length, 4.5 mm.

♂.—Palpi with the apical portion clubbed, clothed with yellow scales with golden luster, a narrow dark ring at the middle of the club, the shaft ringed with dull ochreous at the apex and at the constriction and broadly marked with the same color on the apical portion; antennæ pale brown and ferruginous with silky luster. Length, 4.5 mm.

Seven specimens, Chagres River, Panama (August Busck, collector); Tabernilla, Canal Zone, Panama (August Busck, collector); Gatun, Canal Zone, Panama (A. H. Jennings, collector).

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Type.—No. 10877, U. S. National Museum.

There is some variation in the banding of the hind tarsi. In two specimens the penultimate and apical white rings of the second joint are united; in one the apical white ring of the first joint is divided by a black bar, in another the penultimate ring is so divided, while in a third, the apical, penultimate, antepenultimate and another white ring are so divided, this specimen having eleven white rings on this joint instead of seven as in the type.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF ANOPHELES MALEFACTOR:

Female.—Proboscis moderate, straight, uniform; labellæ long, lanceolate, with fine outstanding setæ; vestiture black, roughened basally. Palpi nearly as long as the proboscis, stout, roughened by long erect spatulate scales, black, a few yellowish ones intermixed, a pale ring at base of last joint and at middle of long joint. Antennæ filiform, the joints subequal, rather short, blackish, densely pilose; hairs of whorls sparse, pale, short; tori small, subspherical, with a cup-shaped apical excavation, dark brown, with a patch of pale scales on outer side. Clypeus broad, rounded triangular, dull brown, nude. Eyes well separated on the vertex, black. Occiput with a median groove, piceous, densely clothed with erect triangular spatulate black scales with paler tips, some yellowish-white ones on the vertex; a row of recumbent white scales along eye margins extending forward to their anterior angles; a group of long pale hairs between the eyes projecting forward; hairs along margins of eyes long, black.

Prothoracic lobes small, lateral, clothed with erect spatulate black scales. Mesonotum narrow, elongate, brownish-gray, pruinose, irregularly mottled with small deep brown dots; a pair of indistinct, narrow, longitudinal bare lines on anterior half of disk; a pair of broader bare lines outward on posterior half, a large black spot at their anterior ends near lateral angles, a large black spot basally on antescutellar space; vestiture of fine pale yellowish hairs, mostly arising from black spots, some long, narrow pale scales intergrading with the hairs near anterior margin, a few erect, spatulate black scales at anterior angles; bristles over roots of wings short, pale yellow. Scutellum collar-like, gray pruinose, with a black spot in the middle continuous with that on mesonotum, clothed with pale hairs and dark marginal bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ and coxæ pale gray pruinose with blackish patches, fine hairs, and small patches of white scales.

Abdomen subcylindrical, depressed, truncate at tip, brownish-black, evenly clothed with fine pale hairs and some scattered broad pale scales on last three segments, a series of conspicuous tufts of black spatulate outstanding scales at posterior angles of segments with some white ones near them; venter with scattered broad white scales, hind margins of segments with coarse, erect black scales.

Wings (plate 41, fig. 2) moderate, hyaline, with three brown pigment spots along costa and two smaller ones on the cross-veins; petiole of second marginal cell nearly as long as its cell, that of second posterior cell somewhat longer than its cell; basal cross-vein distant about its own length from anterior cross-vein; outstanding scales of veins broadly ovate, small, white and pale yellow with black ones in spots as follows: three large spots on the costa, limited at both ends by white scales, the membrane beneath them infuscated, the basal one smaller, involving subcostal and first veins, the others very large, involving the second vein, the outer one both branches of its fork; numerous black scales on the costa, subcostal and first veins between the large spots and beyond, apically and subapically, small irregular spots; third vein with two small spots at and near base and two others at and near apex, a few black scales scattered along its whole length; fourth vein mostly black-scaled to the fork, a larger spot on the base of the fork, three smaller on upper branch and three on lower; fifth vein with black scales intermixed, five spots on upper fork, two on lower; sixth vein with seven small black spots. Halteres pale at base, scaled with white on upper side, the knobs black with broadly white-scaled margins.

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Legs long and slender; vestiture black with numerous small white spots; femora and tibiæ finely speckled with white; hind tarsi with seven white rings or spots on first joint, four on the second, third and fourth white at base and tip and ringed in the middle, fifth all white; fore tarsi with six white rings or spots on first joint, second joint with three, third and fourth white at base and apex, fifth white; mid tarsi with the maculation much reduced, the third, fourth and fifth joints without well-marked rings. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis uniform, nearly straight, black-scaled. Palpi about as long as the proboscis, the last two joints swollen, forming a distinct club and with long, dense yellowish hairs; two last joints golden-yellow scaled, with a narrow dark ring at the articulation; long joint black-scaled, a large patch of yellow scales at base above, a broad yellowish ring at the middle, a long dorsal mark of yellowish scales towards apex, extreme tip also yellow. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others rather short, slender, subequal, pale, with dark basal rings; hairs of whorls long, dense, brown with yellow luster. Coloration as in the female. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture sparser. Claw formula, 2–0.0–0.0.

Length: Body about 5 mm.; wing 4 mm.

Genitalia (plate 39, fig. 259): Side-pieces less than twice as long as wide, the tips conically rounded; a stout seta near the middle of the inner margin, and two separated stouter ones toward the base; clasp-filament long and slender, slightly attenuated mesially, with a minute terminal claw. Basal appendages leaf-like. Unci with spatulate terminal appendages.

Larva, Stage IV.—Head elliptical, longer than wide; antennæ moderately stout, rather long, finely spinulate, the tuft at basal third; dorsal head-hairs feathered, anterior series with the median pair simple, those on the anterior angles double, each hair divided at tip. Abdomen with five pairs of fan-shaped tufts (plate 130, fig. 458), the single elements lanceolate, the edges on the outer part slightly notched. Lateral plates of eighth segment posteriorly with a series of teeth alternatingly long and short. Anal segment with dorsal plate and well-developed ventral brush; anal gills rather long, lanceolate, blunt at tips.

Mr. Busck found the larvæ in still pools of a running brook, in a slowly running spring full of leaves, and in an open pool. The females have been taken in habitations and filled with blood.

Panama.

Rio Chagres, June 7, 1907 (A. Busck); Tabernilla, Canal Zone, May 2, 1907 (A. Busck); Barracks, Caldera Island, Porto Bello Bay, January 4, 1908 (A. H. Jennings); Black Barracks, Gatun, Canal Zone (A. H. Jennings); Ancon, Canal Zone (A. H. Jennings); Gold Hill Camp, Canal Zone, May 9, 1908 (A. H. Jennings); Miraflores, Canal Zone, January 5, 1909 (A. H. Jennings); Porto Bello (A. H. Jennings).

Anopheles malefactor much resembles the Brazilian *A. pseudomaculipes* Peryassú (Os Culic. do Brazil, 108, 1908) in general appearance as well as in the wing-pattern and the other details of coloration. The latter species, of which we have a specimen from Xerém, State of Rio de Janeiro, kindly transmitted by the Instituto Oswaldo Cruz, differs especially in the shape of the wing-scales, these being larger and much more elongate than in our species.

ANOPHELES EISENI Coquillett.

Anopheles eiseni Coquillett, Journ. N. Y. Ent. Soc., x, 192, 1902.
Anopheles eiseni Giles, Revision Anophelinæ, 24, 1904.
Anopheles eiseni Blanchard, Les Moustiques, 620, 1905.
Mysomyia tibiamaculata Neiva, Brazil-Medico, xx, 288, 1906.
Mysomya tibiamaculata Neiva, Uma nova especie de Anophelina Brazileira (Trab. Inst. Manguinhos), 1906.

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Anopheles eiseni Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 177, 1906.
Anopheles eiseni Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 12, 1906.
Anopheles eiseni Theobald, Mon. Culic., iv, 38, 1907.
Myzorhynchella tibia-maculata Peryassú, Os Culic. do Brazil, 40, 60, 101, 1908.
Anopheles eiseni Busck, Smiths. Misc. Colls., quart. iss., lii, 58, 1908.
Myzomyia tibiamaculata Neiva, Mem. Inst. Osw. Cruz, i, 70, 1909.
Anopheles eiseni Theobald, Mon. Culic., v, 14, 1910.
Myzorhynchella tibia-maculata Theobald, Mon. Culic., v, 45, 46, 1910.
Anopheles eiseni Darling, Stud. Rel. Malaria, Isthm. Canal Comm., 10, 1910.
Anopheles eiseni Jennings, Journ. Econ. Ent., v, 134, 1912.
Anopheles eiseni Knab, Amer. Journ. Trop. Dis. & Prev. Med., i, 36, 217, 1913.

ORIGINAL DESCRIPTION OF ANOPHELES EISENI:

Near *maculipennis*, but with a patch of whitish scales on the first vein before its middle and another at its apex, also the apical fourth of the hind tibiae is yellowish-white. Black, the stems of halteres whitish, coxae and a vitta on lower part of pleura, yellow, femora yellowish-brown, apical fourth of hind tibiae yellowish-white; antennae of male whitish, the first joint, last two and fascia on each of the others, brown; scales of palpi black, those at apex and two bands in the female, three in the male, white; scales of occiput black, those in middle of upper part white; mesonotum grayish pruinose, marked toward each side with a velvet black vitta; scales of abdomen black, the hairs yellowish, scales of femora and tibiae mixed black and whitish, those on the apical whitish portion of hind tibiae white, those on the tarsi black; tarsal claws of female simple; wings hyaline, the veins and scales brown, a dense patch of black ones at base of second vein, a larger one on the crossveins and a small one at bases of first submarginal and of second posterior cell, a small patch of yellowish-white scales on first vein before its middle and another at its apex, the latter spot encroaching upon the costal vein. Length, 3.5 mm.

Habitat.—Aguna, Guatemala (2,000 feet altitude).

One female and two males received by Dr. L. O. Howard from Professor Gustav Eisen, of San Francisco, Cal., who has brought to light several interesting forms in this family, and to whom this species is respectfully dedicated. Type No. 6699, U. S. National Museum.

ORIGINAL DESCRIPTION OF MYZOMYIA TIBIAMACULATA:

Proboscida.—Do tamanho do abdomen, uniformemente escura, exceptuando a ponta, que é amarellada; coberta, principalmente na base, de escamas lanceoladas, longas, recurvadas e escuras, possuindo tambem cerdas escuras em toda a extensão da proboscida; sómente na parte de côr mais clara não se encontram escamas, porém cerdas em pequeno numero e de côr mais clara.

Palpos.—Do tamanho da tromba, pretos, menos nas extremidades livres, que são de côr branca; densamente cobertos de escamas pretas, longas e curvas, principalmente no primeiro articulo; o ultimo, porém, é branco, possue escamas da mesma côr. Existem cerdas longas, pretas, não muito abundantes, a não ser no ultimo articulo, no qual, além de serem abundantes, são de côr amarella.

Antennas.—Mais ou menos do mesmo comprimento dos palpos, muito pilosas, de côr clara, de pellos cinzentos e brilhantes, com verticillos mais escuros.

Tóras.—Globuloso, alaranjado; o segundo articulo apresenta-se entumescido em relação aos demais, principalmente aos dous ultimos, que são os maiores e os mais delgados; encontram-se escamas brancas, alongadas no lado interno do segundo e terceiro articulos.

Clypeus.—Quasi escuro, glabro.

Vertex.—Com escamas brancas pequenas e recurvadas, além de outras muito longas e curvas formando tufo em anteversão.

Occiput.—A parte anterior é coberta por muitas escamas brancas, alongadas e encurvadas. A parte posterior é revestida de escamas grandes, negras, accumuladas mui densamente; existem cerdas longas e escuras. As escamas brancas, como as pretas, são de duas fórmas, uma mais larga e menor, outra maior e mais estreita.

Lobos próthoraxicos.—Muito salientes, revestidos de escamas amarellas e pretas, estas em muito maior numero, obovaes, algumas bifurcadas, sendo geralmente de diversos comprimentos; existem ainda cerdas longas, amarellas e pretas.

Mesonoto.—Cinzento no meio e escuro nos lados. E' percorrido longitudinalmente por tres linhas de côr castanho escuro. Existem muitos pellos amarellados na zona acinzentada. As duas faixas pretas dos lados possuem numerosas cerdas pretas. Na parte médiana e anterior existe um tufo de escamas longas, estreitas, curvas e brancas, repartidas para os lados.

Escutello.—Saliente, sem formar lobos, cinzento, com tres manchas pretas, sendo a maior a do meio, a qual é apenas a terminação da linha longitudinal e médiana do mesonoto. Existem implantadas muitas cerdas, de 15 a 20, pelo menos, em todo o *scutellum.*

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Metanoto.—Escuro e glabro.

Pleuras.—Castanho-claras, glabras.

Coxas.—Amarelladas; possuem cerdas longas, amarelladas.

Balancins.—Com pedunculo amarello e capitulo escuro densamente coberto por escamas pretas.

Abdomen.—De côr escura carregada, coberto de pellos amarellos; sendo geralmente na base dos segmentos a tonalidade mais clara. Na parte ventral é amarella nas bases dos primeiros segmentos.

Pernas.—Throchanteres amarellados nos tres pares, com numerosos pellos amarellados, longos, voltados para baixo. Primeiro par de femures castanhos escuros, amarellados na base; na parte externa do apice existem algumas escamas eriçadas, longas e escuras, formando um pequeno tufo; tibias um pouco mais claras que os femures; são amarelladas nas extremidades é um pouco entumescidas na parte apical, que tem escamas e pellos amarellos; os metatarsos e os tarsos são da mesma côr. Segundo par de femures da mesma côr que os do primeiro par, com extremidades amarelladas, em maior extensão que na base; no apice existem algumas escamas amarellas. Tibia, metatarsos e tarsos da mesma côr dos femures. As tibias possuem, porém, extremidades amarelladas.

Terceiro par de femures com a mesma côr dos outros, com extremidades amarellas, principalmente na parte inferior e basal. Tibias com a mesma côr; a extremidade basal é amarella; a extremidade apical, n'uma grande extensão, equivalante a ¼ das tibias, apresenta uma mancha branca, muito caracteristica; sómente na parte anterior ha uma estria da coloração geral. Os metatarsos e tarsos da mesma côr que os outros.

Asas.—Manchadas de amarello na costa e com manchas da mesma côr espalhadas pela aza. As manchas da costa são em numero de tres, duas mais ou menos do mesmo tamanho e menores, situadas mais para a base do que a ultima, que está localisada na parte apical. Todas attingem á primeira nervura longitudinal. Na base da primeira nervura longitudinal ha escamas amarellas n'uma extensão não pequena; ha ainda na mesma nervura escamas da mesma côr entre a primeira e segunda manchas costaes; existe outra mancha da mesma côr, porém mais clara, no ramo posterior da segunda nervura; na base da terceira nervura, no ramo anterior da quarta, no apice do ramo posterior da quinta, na base da quinta nervura, no ramo anterior desta e na base da sexta nervura existem escamas amarellas, que mancham a aza. Na franja as manchas estão situadas entre as extremidades dos ramos da segunda nervura e na terminação dos ramos da quarta e da quinta. A nervura transversal média fica mais distante da base da aza do que a supra-numeraria e a posterior. A primeira cellula sub-marginal é maior e mais estreita do que a segunda callula posterior; esta possue um pedunculo quasi igual a quatro vezes o seu comprimento.

Comprimento.—5,5 mm com a proboscida, que mede 2 mm.

Habitat.—Oliveira, Estado de Minas Geraes.

Epoca da captura.—Maio.

Esta especie foi capturada pelo Dr. Carlos Chagas, que, a tendo reconhecido como nova, enviou para o *Instituto de Manguinhos*, onde foi estudada e descripta.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF ANOPHELES KIRBYI:

Female.—Proboscis moderate, straight, uniform; labellæ long, lanceolate, with fine outstanding setæ; vestiture black. Palpi as long as proboscis, uniform, slightly roughened by outstanding scales; vestiture black, broadly white at apex, involving all of last joint and tip of preceding, a broad white ring involving base of penultimate joint and tip of long joint. Antennæ filiform; joints long, slender, subequal, blackish, densely pilose; hairs of whorls sparse, moderate, black; tori small, subspherical, with a cup-shaped apical excavation, blackish-brown. Clypeus elongate, prominent, rounded triangular, blackish, nude. Eyes well separated on the vertex, black. Occiput with a median groove, blackish, densely clothed with erect triangular scales, black, a large patch of white ones on the vertex, a group of long white hair-like scales between the eyes and projecting forward; a row of coarse black setæ along margins of eyes.

Prothoracic lobes rather large and prominent, lateral. Mesonotum narrow, elongate, brownish-black along the sides, bluish gray pruinose in a broad median stripe, the lateral margins tinged with gray, clothed with scattered short dark hairs, two indistinct, bare, longitudinal concolorous stripes on anterior two-thirds. Scutellum collar-like, brown, gray pruinose, with brown hairs and a row of dark marginal setæ. Postnotum elliptical, prominent, dark brown, nude. Pleuræ blackish above, pale greenish below, with fine hairs; coxæ pale greenish.

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Abdomen subcylindrical, depressed, truncate at tip, brownish-black, without scales, clothed dorsally with scattered fine brown hairs; venter pale greenish, the apices of the segments blackish, more coarsely hairy.

Wings (plate 41, fig. 16) moderate, hyaline; petiole of second marginal cell much shorter than its cell, that of second posterior cell longer than its cell; basal cross-vein distant about its own length from anterior cross-vein; outstanding scales of veins rather broadly lanceolate, blackish brown, intermixed with deeper black ones in indistinct patches as follows: at base of second vein and base of its fork, on third and fourth veins at the cross-veins and base of fork of fourth vein, fifth vein from base to apex of lower branch, a spot on upper branch; a dull brownish-white spot at costal margin just before wing-tip and involving first vein, a second one on the fringe at wing-apex; a small yellowish spot on first vein before middle of wing. Halteres whitish, with black knobs.

Legs long and slender; vestiture black, apical fourth of posterior tibiæ densely clothed with large, slightly raised, lanceolate white scales; femora pale beneath at base. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis rather long and slender, straight. Palpi nearly as long as the proboscis, the tip of long joint and last two joints swollen and furnished with long hairs; vestiture black, last joint entirely white-scaled, penultimate dorsally white at base. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others rather short, subequal, slender, whitish on apical half, dark basally; hairs of whorls long, dense, blackish. Coloration as in the female. Abdomen elongate, subcylindrical, slightly narrowed towards middle, depressed and somewhat broadened towards apex; lateral ciliation coarse but sparse. Wings much narrower than in the female, the stems of the fork-cells longer, the vestiture more sparse. Claw formula, 2–0.0–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 40, fig. 267): Side-pieces rather slender, conically tapering, rounded at tip, over twice as long as wide; clasp-filament long, rather slender, slightly attenuated medianly, apically with a minute stout inserted claw; at base of side-piece are two pairs of stout setæ arising from elevated bases. Basal appendages broad, tapering to a point, smooth. Unci forming a slender column, from the tip of which arise two filaments with serrate outer edges.

Larva, Stage IV.—Head rounded, elongate, longer than wide, bulging at sides, front conically produced; four dorsal head-hairs, single but numerously branched, in a line between the antennæ, a smaller hair at base of antenna; two long approximate spines on front margin. Antennæ subcylindrical, slightly tapered, sparsely spined; a hair tuft very near base; two long terminal processes, a slender hair-tuft exceeding them and a digit at tip. Eyes large, pointed. Mental plate small, with a median tooth and four on each side, the second rather prominent, the third and fourth small and distant. Mandible quadrangular, with a row of long feathered hairs near base and a pair of short feathered filaments on the other side; two long smooth filaments and two serrate ones before tip; an outer row of cilia; a row of short feathered filaments along outer margin; dentition large, of seven teeth, the third large and prominent, the fourth a serration on its lower declivity; a long serrate filament within, a rounded process below composed of confluent spines; basal angle small, with a hair-tuft; a row of long hairs at base. Maxilla rectangular, slightly excavated at inner third, fringed with hairs, with two stout spines at inner angle; two small filaments at base of excavation; palpus conical, not exceeding the maxilla, a dendritic tuft without; a group of digits and flattened appendages at tip. Thorax subquadrate, about as long as wide; hairs short, consisting of branched hairs, single hairs and tufts; mesothorax sparsely haired. Abdomen stout, anterior segments shorter; long feathered lateral hairs on first three segments, double on first and second, single on third; posterior hairs small, smooth; a dorsal series of six pairs of fan-shaped tufts on second to seventh segments (plate 130, fig.

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457). Air-tube sessile, subquadrate, roundedly angled posteriorly. Lateral plates of eighth segment posteriorly with a series of spines, irregularly alternating long and short; the longer of the short ones half as long as the long ones, the shorter ones about one-third. Anal segment about as long as wide, with a small dorsal plate; dorsal brush a long and a short tuft on each side; a single long lateral hair below the plate; ventral brush well developed, of long branched tufts; anal gills moderate, about as long as the segment, bluntly pointed.

Mr Busck found the larvæ in water in hollow trees, open bamboo-joints, and once in a palm-leaf lying on the ground and holding rain-water, and he considers the species as one addicted to tree-holes. Mr. Knab got one larva in a pool in a stream-bed. Mr. Jennings found them in a small pool beside a stream filled with leaves and no algæ present, in water in a hole in a rock beside a stream and in pools among rocks beside a stream and from water in a hole in a tree, in all once in a tree-hole and seven times from stream-pools. The larvæ are therefore not exclusively addicted to tree-holes, but inhabit also pools beside streams, especially those in rocks. It should be remembered in connection with these data that water-bearing tree-holes are much more difficult to locate than water upon the ground. The adults presumably bite, as we have captured specimens, although most of those before us are bred.

Tropical America, from Mexico to southern Brazil.

Córdoba, Mexico, June 13, 1905 (F. Knab); Aguna, Guatemala (G. Eisen); Rio Chagres, Panama, June 7, 1907 (A. Busck); Tabernilla, Canal Zone, Panama, July 18, 1907 (A. Busck); Colon, Panama (A. I. Kendall); Caldera Island, Porto Bello Bay, Panama, January 24, May 29, 1908 (A. H. Jennings); Platanal, Trinidad, West Indies, September 19, 1908 (F. W. Urich). Reported also from Oliveira, State of Minas Geraes, Brazil (A. Neiva).

Anopheles eiseni is the only species in our region with this peculiar type of leg ornamentation. *Anopheles tibiamaculata* Neiva is the same as *eiseni*, according to Dr. Neiva who has examined our material.

ANOPHELES GRABHAMII Theobald.

Anopheles grabhamii Theobald, Mon. Culic., i, 205, 1901.
Cycloleppteron grabhamii Theobald, Mon. Culic., ii, 312, 1901.
Cycloleppteron grabhamii Theobald, Journ. Trop. Med., v, 182, 1902.
Cycloleppteron grabhamii Giles, Handb. Gnats or Mosq., 2 ed., 332, 1902.
Cycloleppteron grabhamii Taylor, Rev. de Med. Trop., iv, 150, 160, 166, 172, 1903.
Cycloleppteron grabhamii Theobald, Mon. Culic., iii, 56, 1903.
Cycloleppteron grabhamii Giles, Rev. Anophelinæ, 20, 1904.
Cycloleppteron grabhamii Pazos, Bull. Soc. Ent. France, 1904, 134, 1904.
Cyclolepidopteron grabhami Blanchard, Les Moustiques, 185, 1905.
Cycloleppteron grabhamii Theobald, Gen. Ins., Dipt., 26 fasc., 8, 1905.
Cycloleppteron grabhamii Theobald, Mosq. or Culic. of Jamaica, 9, 17, 1905.
Cycloleppteron grabhamii Felt, Bull. 97, N. Y. State Mus., 470, 1905.
Anopheles grabhamii Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 176, 1906.
Cycloleppteron grabhamii Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 13, 1906.
Cycloleppteron grabhamii Theobald, Mon. Culic., iv, 55, 1907.
Anopheles grabhamii Pazos, San. y Benef., i, 45, 181, 1909.
Cycloleppteron grabhamii Prout, Ann. Trop. Med. & Paras., iii, 487, 1909.
Cycloleppteron grabhamii Theobald, Mon. Culic., v, 34, 1910.
Anopheles grabhamii Knab, Amer. Journ. Trop. Dis. & Prev. Med., i, 36, 1913.

ORIGINAL DESCRIPTION OF ANOPHELES GRABHAMII:

♀. Head dark brown, with black upright forked scales behind and at the sides, a patch of grey ones in the middle of the head, a few white ones projecting in front, and a long tuft of white hairs spreading outwards; eyes metallic coppery; proboscis long and thin, brown; palpi brown, bright brown at the swollen end, with prominent scales at the base; basal joint of antennæ dark brown.

Thorax silvery-grey, mottled with bright chestnut-brown, with two dark brown eye-like patches on each side towards the posterior half of the mesonotum, and a dark central line in front; a lateral tuft of dark, broadish scales on each side in front, and a patch of hair-like creamy ones in the middle, projecting over the neck; the whole mesonotum covered with scattered golden, curved, hair like scales; scutellum greyish at the sides, brown in the centre; metanotum yellowish-brown in

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some lights, with purplish tinges in others. When viewed with a hand lens the thorax appears bright brown and grey, frosted with grey hairs, the median dark line showing plainly, and also the four lateral spots.

The abdomen is absent, and the legs too damaged to make anything of, but the remaining wing is perfect, and presents the following peculiarities: the costa is dark, with a small pale patch about one-third of the length of the wing from the tip. The apex is fringed with yellow scales, broken by three small blackish patches, the upper part of the yellow fringe appearing as a yellow, apical, costal spot. The veins are sparsely bordered with pale spindle-shaped scales, and scattered over the veins, at wide intervals, are large, deep black scales totally unlike those of any other *Anopheles*. These scales are collected into a dense jet-black spot where the first long vein joins the auxiliary, the black spot of scales involving the second long vein as well. They are also collected rather thickly at the root of the fork-cells, especially of the first sub-marginal cell and elsewhere. The first sub-marginal cell is about the same length as its stem; its base nearer the base of the wing than that of the second posterior cell. The latter is very short and broad, only a little more than half the length of its stem. Posterior cross-vein about its own length distant from the mid cross-vein. The third long vein is carried only a minute distance past the posterior cross-vein.

Habitat.—Jamaica (Dr. Grabham) (24. 11. 1899). (♀)

Time of capture.—November.

Observations.—Described from a single broken specimen. Sufficient remains, however, to show a very marked and peculiar species, which can at once be told from any other *Anopheles* by the large dark scales on the wings. This species probably will form a new genus when sufficient material comes to hand. The remains have been mounted on slide No. 27.

(Signs on label, K g t n. 1. xi. 99. ♀.) Since the above was in type I have received a perfect ♂ and ♀.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF ANOPHELES GRABHAMII:

Female.—Proboscis moderate, rather slender and smoothly scaled, slightly thickened at base; labellæ long, rather large, lanceolate, with fine outstanding setæ; vestiture brownish-black, slightly roughened at base. Palpi nearly as long as the proboscis, uniform, roughened by erect spatulate scales, black throughout, a few short setæ at tip. Antennæ filiform; second joint elongate and thickened, the others short, blackish, densely pilose; hairs of whorls sparse, very short, black; tori rather small, subspherical, with a cup-shaped apical excavation, deep brown, pruinose. Clypeus large and broad, rounded triangular, blackish, pruinose, nude. Eyes well separated on the vertex, black. Occiput with a median groove, piceous, densely clothed with erect triangular scales, black on the sides, white on the vertex, a group of long hair-like white scales between eyes projecting forward; a row of black setæ along margins of the eyes.

Prothoracic lobes small, lateral. Mesonotum narrow, elongate, dull brownish, gray pruinose, a black spot on each side medianly near lateral angles and a small one basally on the antescutellar space; vestiture of scattered, short, pale yellowish hairs, some erect, narrow, elongate white scales near anterior margin. Scutellum collar like, brownish, gray pruinose, with a large black central spot, clothed with sparse pale hairs and black marginal bristles. Postnotum elliptical, prominent, light brown with a blackish central stripe, nude. Pleuræ and coxæ brownish, gray pruinose, mottled with black, with rows of fine hairs and a few white scales on the coxæ.

Abdomen subcylindrical, depressed, truncate at tip, blackish, somewhat rugose, rather evenly clothed with scattered, short, fine shining hairs, some small yellowish white narrow outstanding scales at apical angles of last segment.

Wings (plate 41, fig. 6) rather narrow, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell longer than its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales of veins of two kinds, large, broadly elliptical ones, tending to form spots on the veins, the others much smaller and lanceolate; large scales mostly black; costa black-scaled, a small yellowish-white patch on the outer third and involving first vein, a longer ochreous-yellow spot at tip of wing on fringe and tip of first vein, extending to second marginal cell and interrupted by a black spot at upper

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branch of second vein; a very conspicuous patch of black scales on the costa, involving first vein and origin of second; distinct patches of black scales at base of third vein and bases of forks of second and fourth veins; third vein partly whitish scaled; fifth vein whitish scaled, some black ovate scales towards base, a small black spot at base of fork, another before middle of upper branch and some smaller black scales at tips of both branches; sixth vein with a black patch near base and another at apex. Halteres whitish, with black knobs.

Legs long and slender; femora and tibiæ with yellowish-white and bronzy-brown scales intermixed, mottled with numerous small spots not forming defined rings; tarsi bronzy-brown, the joints with minute, indistinct yellowish basal rings on two or three proximal joints. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis slender, straight, dark scaled. Palpi about as long as the proboscis, the tip of long joint and last two joints swollen, forming a distinct club and with long, dense pale hairs; vestiture blackish-brown throughout. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, rather stout, whitish; hairs of whorls long, dense, brown with silky yellow luster. Coloration as in the female. Abdomen elongate, depressed, grayish-brown, the apices of the segments darker, an ill-defined, median, longitudinal dark stripe inclosing a row of basal elongate median shining black spots. Wing narrower than in the female, the stems of the fork-cells longer, the vestiture less abundant. Claw formula, 2–0.0–0.0.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 40, fig. 266): Side-pieces about twice as long as wide, conical, with a stout spine at about middle of inner margin; clasp-filament as long as side-piece, slender, slightly attenuated medianly and bearing a minute stout terminal claw; at base of side-piece two spines from a common base and a single spine with a rounded tip. Unci slender columnar, with a divaricate tuft of terminal spines.

Larva, Stage IV.—Head rounded, elongate, longer than wide, bulging at sides, front conically produced; both pairs of dorsal head-hairs single but numerously branched, in a line between the antennæ, a smaller hair at base of antenna; two long approximate spines on the front margin. Antennæ subcylindrical, slightly tapered, spined, one spine near the tuft larger; a tuft of four fine hairs at basal fourth; two long terminal digits with stout spines at their bases and a long, stout, branched hair at tip. Eyes large, normal. Mental plate small, with a median tooth and four on each side; first side tooth small, second large, fourth small and basally placed. Mandible quadrangular; a row of long branched hairs at base followed by two feathered filaments; five filaments before tip, with some fine hairs between them and the outer row of cilia; a row of small feathered filaments on outer margin; dentition of five teeth on a slight prominence, first and third longest; two serrate filaments within; a square prominence below, composed of confluent spines; basal angle with a small tuft; a row of long hairs at base. Maxilla quadrangular, slightly obliquely cut on inner side; outer edge serrate, front margin broadly covered with bent hairs; palpus large, exceeding the maxilla, its base roundedly prominent, a dendritic tuft at outer third, a group of irregularly shaped digits at tip. Thorax rounded subquadrate, about as long as wide; hairs short, consisting of branched hairs, single hairs and tufts; mesothorax sparsely haired. Abdomen stout, anterior segments shorter; long feathered lateral hairs on first three segments, double on first and second, single on third; posterior hairs small, smooth; a dorsal series of five pairs of fan-shaped tufts on third to seventh segments (plate 130, fig. 455). Air-tube sessile, subquadrate, roundedly angled posteriorly. Lateral plates of the eighth segment posteriorly with a series of spines of irregular lengths, the long ones very long, the short ones one-fourth their length. Anal segment about as long as wide, with a small dorsal plate; dorsal brush a long and a short brush on each side; a single long lateral hair below the plate; ventral brush well developed,

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of long branched tufts; anal gills moderate, about as long as the segment, bluntly pointed.

Theobald quotes Dr. Grabham as saying that the larvæ will live in any stagnant water, and will flourish in an infusion of decaying animal matter. The adult is found most abundantly in March, April, and May, and is an ardent bloodsucker. The egg is described as follows: "Upper surface broad. Fringe is well developed at each end, represented by a beaded line at the attachment of the floats. Lower surface with roughly hexagonal depressions. Floats occupy middle half of ovum, and are widely separated below. The egg is rather longer and narrower than that of *Cellia albipes*. A captive female will readily lay eggs, depositing about fifty at a time. These are arranged side by side or in radiating groups of three or more together at the edge of the water. This stage lasts forty-eight hours." Mr. Busck found the larvæ in pools in a dried stream-bed, in large holes in coral rock and in a slowly running spring frequented by swine.

Antilles.

San Francisco Mountains, Santo Domingo, August, 1905 (A. Busck); St. Thomas, August, 1905 (A. Busck); Kingston, Jamaica (M. Grabham); Havana, Cuba, October 5, 1902 (J. R. Taylor); Porto Rico, December, 1913 (W. R. Whippitt).

ANOPHELES PUNCTIPENNIS (Say) Say.

Culex punctipennis Say, Journ. Acad. Nat. Sci. Phil., iii, 9, 1823.
Anopheles punctipennis Say, Keating's Narr. Exped. St. Peter's River, ii, 357, 1824.
Anopheles crucians Wiedemann (in part), Ausser. Zweifl. Ins., i, 12, 1828.
Culex hyemalis Fitch, Amer. Journ. Agr. and Sci., v, 281, 1847.
Anopheles crucians Osten Sacken (in part), Smiths. Misc. Colls., xvi, 2, 1858.
Anopheles crucians Osten Sacken (in part), Cat. No. Amer. Dipt., ed. 2 (Smiths. Misc. Colls. No. 270), 19, 1878.
Culex punctipennis Say, Ent. of N. Amer., ii, 39, 1883.
Anopheles punctipennis Howard, Dept. Agr., Div. Ent., Bull. 4, n. s., 23, 1896.
Anopheles punctipennis Coquillett, U. S. Dept. Agr., Div. Ent., Circ. 40, 2 ser., 4, 1900.
Anopheles punctipennis Howard, U. S. Dept. Agr., Div. Ent., Bull. 25, n. s., 21, 44, 1900.
Anopheles punctipennis Giles, Handb. Gnats or Mosq., 164, 1900.
Anopheles punctipennis Th. Smith, Journ. Boston Soc. Med. Sci., v, 321, 1901.
Anopheles punctipennis Howard, Mosquitoes, 113, 240, 1901.
Anopheles punctipennis Theobald, Mon. Culic., i, 189, 1901.
Anopheles punctipennis Herrick, Science, N. S., xiv, 329, 1901.
Anopheles punctipennis Veazie, N. Orleans Med. & Surg. Journ., liv, 163, 1901.
Anopheles punctipennis Herrick, Bull. 74, Mississippi Agr. Exp. Sta., 11, 1901.
Anopheles punctipennis Garman, Bull. 96, Ky. Agr. Exp. Stat., 204, 1901.
Anopheles punctipennis Giles, Handb. Gnats or Mosq., 2 ed., 322, 1902.
Anopheles punctipennis Dyar, Proc. Ent. Soc. Wash., v, 46, 1902.
Anopheles punctipennis Theobald, Mon. Culic., iii, 19, 1903.
Anopheles punctipennis Dyar, Proc. Ent. Soc. Wash., v, 140, 1903.
Anopheles punctipennis Johannsen, Bull. 68, N. Y. State Mus., 406, 1903.
Anopheles punctipennis Giles, Revis. Anophelina, 20, 1904.
Anopheles punctipennis Hirshberg, Johns Hopkins Hosp. Bull., xv, 53, 1904.
Anopheles punctipennis Felt, Bull. 79, N. Y. State Mus., 266, 1904.
Anopheles punctipennis Smith, N. J. Agr. Exp. Stat., Bull. 171, 30, 1904.
Anopheles punctipennis Blanchard, Les Moustiques, 167, 1905.
Anopheles punctipennis Jordan & Hefferan, Journ. Infect. Dis., ii, 57, 1905.
Anopheles punctipennis Smith, Rept. Mosquitoes N. J., 163, 1905.
Anopheles punctipennis Felt, Bull. 97, N. Y. State Mus., 449, 469, 1905.
Anopheles punctipennis Dyar, Journ. N. Y. Ent. Soc., xiii, 23, 1905.
Anopheles punctipennis Theobald, Gen. Ins., Dipt., 26 fasc., 7, 1905.
Anopheles punctipennis Britton & Viereck, Rept. Conn. Agr. Exp. Stat. 1904, 263, 271, 1905.
Anopheles punctipennis Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 175, 176, 1906.
Anopheles punctipennis Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 12, 1906.
Anopheles punctipennis Dyar, U. S. Dept. Agr., Bur. Ent., Circ. 72, 1, 1906.
Anopheles punctipennis Quayle, Bull. 178, Agr. Exp. Station, Berkeley, Cal., 52, 1906.
Anopheles punctipennis Dyar, Proc. U. S. Nat. Mus., xxxii, 122, 1907.
Anopheles punctipennis Howard, Osler's Modern Medicine, i, 378, 383, 385, 1907.
Anopheles punctipennis Theobald, Mon. Culic., iv, 27, 1907.
Anopheles punctipennis Banta, Fauna Mayfield's Cave, Carnegie Inst. Wash., 35, 84, 1907.

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Anopheles punctipennis Knab, Psyche, xiv, 1, 1907.
Anopheles perplexens Ludlow, Can. Ent., xxxix, 267, 1907.
Anopheles perplexens Dyar & Knab, Can. Ent., xl, 312, 1908.
Anopheles punctipennis Viereck, 1st Ann. Rept. Comm. Health Pa., 469, 1908.
Anopheles perplexens Ludlow, Can. Ent., xli, 21, 1909.
Anopheles perplexens Dyar & Knab, Can. Ent., xli, 101, 1909.
Anopheles perplexens = *punctipennis* Ludlow, Can. Ent., xli, 293, 1909.
Anopheles punctipennis Thibault, Proc. Ent. Soc. Wash., xii, 22, 1910.
Anopheles punctipennis Theobald, Mon. Culic., v, 7, 1910.
Anopheles perplexens Theobald, Mon. Culic., v, 7, 1910.
Anopheles punctipennis Morse, Ann. Rept. N. J. State Mus., 1909, 716, 1910.
Anopheles punctipennis Cora A. Smith, Psyche, xxi, 1, 1914.

ORIGINAL DESCRIPTION OF CULEX PUNCTIPENNIS:

Body dark rufous, covered with cinereo-ferruginous hair; feet elongated; wings maculated.

Inhabits the United States.

Orbits, bright cinereous; *eyes* deep black; *antennae* and *proboscis* deep fuscous or blackish immaculate; *thorax* dark rufous, with obsolete blackish lines, and covered with cinereo-ferruginous hair; *wings* hairy, dusky with a hardly perceptible pale band beyond the middle, and obsolete dusky spots; *scutel* glabrous, dark rufous, with a longitudinal bluish vitta; *halteres* yellow at base; *feet* elongated, deep fuscous or blackish; *pectus* each side above the posterior feet plumbeous.

It is probable this is the species which Fabr. considers as the same with the *pulicaris* of Europe; it is common on the Mississippi, and troublesome to travellers. When the insect is at rest, the wings being incumbent one on the other, the pale band is very distinct; when recent, the eyes are greenish-blue. I observed this species in considerable numbers on the Eastern shore of Maryland. The dusky spots on the wings of this species, are occasioned by the thicker growth of hair in those parts.

ORIGINAL DESCRIPTION OF CULEX HYEMALIS:

Thorax cinereous, with a broad black vitta on each side; extreme tips of the wings and two spots on their anterior margins black, with two intervening sericeous yellowish-white spots.

Length 0.22; to the tips of the wings 0.28, or including the beak 0.39.

Head cinereous-pubescent, occiput black-pubescent. Proboscis black, its apex cinereous. Palpi black, the tips varied with gray. Antennae black, tips brown. *Thorax* cinereous-pubescent, with a broad rufous-black vitta on each side, passing above the wing-sockets; the vitta often edged on its upper side with yellowish-white; a very slender, black, dorsal line, often partially obsolete. Scutel glabrous, dark brown. Poisers black, their pedicels white. *Abdomen* clothed with longish gray hairs, black or dark brown, with two rows of whitish spots on each side; in the males obscure white, the posterior margins of the segments black. *Wings* subhyaline, with two blackish spots on the anterior margin, separated by a conspicuous glossy yellowish-white spot; inner spot with a strong notch on its posterior side which is formed by a yellowish-white dot, and a similar dot is placed on the inner side of this spot; outer spot with an oblique yellowish-white band on its outer side, beyond which, at the tip of the wing, is a slight blackish transverse spot. Under a magnifier, these spots are found to be produced by the colors of the scales upon the nerves of the wings, which scales are regularly and beautifully dyed with black and yellowish white, as follows: The posterior or anal nerve has black scales the last half of its entire length, and also at its base: the next or interno-medial nerve, which forks in its middle, is clothed throughout with black scales, including both its branches: the next or externo-medial has black scales on the basal fourth of its length, two broad annuli of black scales on its middle, another annulus at its fork, and a fifth series at the tips of each of its branches; the next is clothed with black scales through its entire length: the next is black where it first becomes plainly visible in the middle of the wing, again for a short distance after the origin of the preceding nerve, again for a considerable space at its fork, and again at the apex of its posterior branch only: the costal and the marginal nerves have black scales from their bases; these become much more dense at the black spots of the anterior margin, and are replaced by yellowish scales only between these spots and beyond the entire one. *Legs* black; femurs pale towards their bases; tips of femurs and of tibiae whitish. Coxae pale.

The Winter Musketoe is met with in the last days of autumn and again for a short time in the first days of spring, and specimens are occasionally found in any of the winter months. It is a somewhat rare insect, which no one can fail to distinguish clearly by the marks on its wings as above described.

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ORIGINAL DESCRIPTION OF ANOPHELES PERPLEXENS:

(Female.)—Head dark, with dark brown and white fork scales, the latter nearer the vertex, and a heavy tuft of slender, long curved white scales projecting cephalad between the eyes; antennae dark brown, verticels and pubescence dark, basal joint brown; palpi dark, covered with dark brown scales, a small tuft of white hairs at the very tip; proboscis dark with dark brown scales, tip testaceous; clypeus dark, eyes brown.

Thorax: prothoracic lobes testaceous, with dark hairs; mesonotum with broad, light median stripe, covered with white "frost," and white hairs arranged so as to suggest a "part," a dark median line extending half way to the scutellum, and two dark lateral bordering lines; more or less of a tuft of these hairs at the nape; laterad the dorsum is dark brown, with dark brown hairs; pleura brown; scutellum testaceous, "frosty," with brown bristles; metanotum dark brown.

Abdomen dark brown, with light hairs (no scales).

Legs: Coxae and trochanters light, mostly light scaled; femora ventrally light scaled, and extreme tips of femora and tibiae ochraceous, remainder of legs dark brown; ungues simple.

Wings clear, and rather heavily clothed with dark brown scales, except a few small ochraceous spots—one on the costa, just interior to a line drawn through the junction of the branches of the fork cells, a second tiny spot at the junction of the first long vein with the costa, extending a tiny bit on the long vein, and two very small faint light spots on the forks of the fourth long vein, also a tiny fringe spot at the distal end of the third long vein; halteres with light stems and fuscous knobs.

Length, 2.5–3 mm. Habitat, Camp Roosevelt, Mt. Gretna, Pa. Taken August 25, 1906.

This interesting species was sent by Capt. E. B. Whittemore, Asst. Surg. U. S. Army, and, as will be seen from the description, bears a closer resemblance to tropical Anophelina than to those so far reported from the U. S., but as the group it most closely resembles has abdominal scales and rather broader wing-scales it cannot be referred to it.

DESCRIPTION OF FEMALE, MALE, LARVA, PUPA, AND EGG OF ANOPHELES PUNCTIPENNIS:

Female.—Proboscis moderate, rather slender, slightly thickened basally, smoothly scaled; labellæ long, lanceolate, luteous, with fine outstanding black setæ; vestiture black with a slight bluish reflection. Palpi about as long as the proboscis, slender, uniform, somewhat roughened by raised elliptical scales towards base, brownish-black, some short setæ at tip. Antennæ filiform; second joint long and thickened, the others shorter, subequal, rugose, blackish, densely pilose; hairs of whorls sparse, short, black; tori small, subspherical, with a cup-shaped apical excavation, blackish without, rim luteous. Clypeus broad, rounded triangular, blackish, nude. Eyes well separated on the vertex, black. Occiput with a median groove, dark brown, densely clothed with erect, elongate triangular scales, black behind and at the sides, creamy-white on the vertex, a group of long white hair-like scales between the eyes and projecting forward; a row of black setæ along margins of eyes.

Prothoracic lobes lateral, prominent. Mesonotum narrow, elongate, blackish-brown on the sides, a broad, median, longitudinal, light gray, strongly pruinose stripe, marked with three impressed lines on anterior two-thirds, a short median black line basally on antescutellar space; vestiture of scattered pale yellowish hair-like scales, denser at anterior margin. Scutellum collar-like, grayish-brown, pruinose, an ill-defined median black stripe continuous with that on mesonotum; sparsely clothed with pale hairs and with blackish marginal bristles. Postnotum elliptical, prominent, dark brown, pruinose, nude. Pleuræ variegated in blackish, gray pruinose, and whitish, with a few fine hairs; coxæ luteous.

Abdomen subcylindrical, depressed, truncate at tip, brownish-black, gray at bases of segments; dorsal vestiture of rather long, fine pale hairs arising from very small black punctures.

Wings (plate 41, fig. 7) moderate, hyaline; petiole of second marginal cell much shorter than its cell, that of second posterior cell about equal to its cell; basal cross-vein distant about its own length from anterior cross-vein; outstanding scales of veins rather narrowly lanceolate, dense, black and yellowish-white, the black predominating, the white disposed as follows: a large patch of white

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scales at outer third of costa involving first and second veins, a small patch involving the same veins close to apex of wing, a small patch of pale scales on each branch of second vein; fourth vein with two pale spots on stem and one on each fork; sixth vein with a long patch of pale scales in the middle. Halteres whitish, with brown knobs.

Legs long and slender; brownish-black, tips of femora and tibiæ narrowly whitish. Claw formula, 0.0–0.0–0.0.

Length: Body about 5 mm.; wing 4.5 mm.

Male.—Proboscis slender, straight, black-scaled. Palpi slightly longer than the proboscis; last two joints short, swollen, club-shaped, with dense, long brownish hairs; vestiture dark throughout. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others shorter, subequal, pale, with black basal rings; hairs of whorls long, dense, brown, with silky luster. Coloration as in the female. Abdomen long, depressed, somewhat narrowed near base, gray pruinose; lateral ciliation long and abundant, pale yellowish. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture sparser. Claw formula, 2–0.0–0.0.

Length: Body about 5 mm.; wing 4.5 mm.

Genitalia (plate 40, fig. 268): Side-pieces about twice as long as wide, conical, bearing a long stout spine at middle of inner margin, at base a pair of stout spines inserted on low tubercles, a pair of unequal spines arising from a detached conical piece. Clasp-filament longer than side-piece, slender, slightly enlarged at base and apex, with a small and stout articulated terminal spine. Basal appendages large, leaf-like. Unci slender, columnar, bearing two tufts of long spines which project at right angles.

Larva, Stage IV (see the figure of the entire larva, plate 84).—Head rounded, elongate, longer than wide, bulging at sides, front conically produced; both pairs of dorsal head-hairs single but numerously branched, in a line between antennæ, a smaller hair at base of antennæ; two long approximate setæ on the front margin. Antennæ subcylindrical, slightly tapered, spined on one side; a tuft of four hairs at basal third; two long dentate articulated terminal processes, one short one and a small hair-tuft. Eyes large, pointed. Mental plate small, narrow, with a median tooth and four on each side, first and second subequal, well spaced, third distant, fourth small. Mandible quadrangular, convex without; seven large branched hairs on dorsal aspect in a group, two smaller ones near them; two pairs of flat appendages near tip; an outer row of cilia; terminal dentition of twelve teeth, the upper three projected, bearing the fourth, fifth, and sixth on the lower declivity; two filaments above, three large ones within, a square finely dentate process below; a thick process at end of dentition, another at base, between these a dense row of setæ, the central ones longest. Maxilla rounded rectangular, palpus attached by a narrow constriction; numerous short setæ and spines on inner aspect; palpus with round projecting base, dendritic tuft without, terminally five digits and two flattened appendages. Thorax rounded quadrate, about as long as wide; hairs short, consisting of branched hairs, single hairs and tufts, the mesothorax sparsely haired. Abdomen stout, anterior segments shorter; long, feathered lateral hairs on the first three segments, double on the first and second, single on third; posterior hairs small, smooth; a dorsal series of six pairs of fan-shaped tufts on second to seventh segments (plate 130, fig. 451), the first pair small, the others well developed; elements of tufts bluntly notched towards tips. Air-tube sessile, subquadrate, roundedly angled posteriorly. Lateral plates of eighth segment posteriorly with a series of spines, longer and shorter ones irregularly arranged. Anal segment about as long as wide, with a small dorsal plate; dorsal brush a long and a short tuft on each side; a single long lateral hair below plate; ventral brush well developed, of long branched tufts; anal gills moderate, about as long as the segment, bluntly pointed.

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Pupa (plate 150, fig. 709).—Cephalothoracic mass subpyriform, the hairs small and few; air-tubes short, funnel-shaped, notched on one side. Abdomen stout, thick, the distal segments depressed; hairs abundant but short, each segment with a short stout pointed spine at apical angles; anal paddles long, with a terminal seta.

Egg (plate 147, figs. 693, 694 *).—Elongate fusiform, reticulate ventrally, finely granular dorsally; floats large, extending nearly to apices, closely approximated medianly on dorsal surface, arcuately produced at sides to apical fourths, widely separated on ventral surface and showing only on middle third of sides.

The eggs are laid singly or in small groups upon the surface of water. The larvæ are found in all sorts of water in ground-pools and streams and occasionally in artificial receptacles. The larvæ are found all the season, breeding being continuous until winter. The larvæ occur most commonly in swamps containing algæ, but also in springs along the edges of streams and in rain puddles or even artificial receptacles. Where very abundant they occur in almost any water. Larvæ have been found repeatedly and in numbers in rain-puddles, the water muddy and without trace of algal growth; rearings from these larvæ gave exclusively *A. punctipennis*. Associated with this species, the larvæ of *A. quadrimaculatus* frequently occur, although usually in distinctly lesser numbers. Jordan and Hefferan, in Michigan, found that the two species segregated according to character of breeding-places, spring-fed pools being inhabited exclusively by *Anopheles punctipennis*, while in the river, only a few feet away, the other species was abundant. The females bite at dusk, seldom by day, and they are less aggressive than other species. The female hibernates. Mr. Knab has observed the mating habits of the adults and his description of them will be found in the first volume, pages 126–128, of this work.

Southern Canada, United States and southward to central Mexico.

Ottawa, Ontario, August 16, 1900 (A. Gibson); Weld, Maine, August, 1910 (H. G. Dyar); Plattsburg, New York, August 9, 1901 (H. G. Dyar); Center Harbor, New Hampshire, July 17, 1902 (H. G. Dyar); Durham, New Hampshire (C. M. Weed); Dublin, New Hampshire (A. Busck); Monadnock, New Hampshire, May 1, 1911 (A. H. Thayer); West Springfield, Massachusetts, May 14, 1903 (F. Knab); Granby, Massachusetts, September 15, 1903 (F. Knab); Chicopee, Massachusetts, September 23, 1903 (F. Knab); Ithaca, New York, August, September, 1901 (O. A. Johannsen); Bellport, New York (H. G. Dyar); West Fairview, Pennsylvania, August 18, 1900 (H. G. Bashore); Danville, Pennsylvania, October 25, 1901 (G. B. M. Free); Delair, New Jersey, August 20, 1901 (W. P. Seal); Jackson's Island, Maryland, July 29 (H. S. Barber); Plummer's Island, Maryland, November 9, 1902 (W. V. Warner); Washington, District of Columbia, April 24, 1907 (O. Heidemann), October 5, 1911 (H. G. Dyar); Huntington, West Virginia, November 11, 1902 (A. D. Hopkins); St. Elmo, Virginia, May 12 (F. C. Pratt); Difficult Run, Virginia, July 11, 1906 (Knab & Barber); Glencarlyn, Virginia, May 3, 1903 (W. V. Warner); Greensboro, North Carolina, August, 1901 (F. C. Pratt); Hendersonville, North Carolina, March 24, 1913 (W. B. W. Howe); Henderson County, North Carolina, October 7, 1901 (J. C. Coker); Spartanburg, South Carolina, September 21, 1906 (—— Moore); Atlanta, Georgia, September 5, 1902 (C. A. Smith); Corinth, Mississippi, August 14, 1904 (H. S. Barber); Agricultural College, Mississippi, October 31, 1900 (G. W. Herrick); St. Louis, Missouri, October 4, 1904 (A. Busck); Scott, Pulaski County, Arkansas, September 24, 1909 (J. K. Thibault, Jr.); Urbana, Illinois, August 8, 1904 (F. Knab); Athens, Tennessee, August 21, 1904 (H. S. Barber); Columbia, Tennessee, August 16, 1904 (H. S. Barber); Corbin, Kentucky, August 29, 1904 (H. S. Barber); Georgetown, Kentucky, August 26, 1904 (H. S. Barber); Onaga, Kansas, October 8 (F. F. Crevecoeur); Dallas, Texas, September 14, 1905 (W. E. Hinds); Kerrville, Texas, April 11, 1907 (F. C. Pratt); Devil's River, Texas, May 6, 1907 (F. C. Pratt); Paris, Texas, April 26, 1904 (C. T.

* Figure 693 represents the ventral aspect of the egg, figure 694 the dorsal aspect, contrarily to the statement on the plate.

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Brues); Denison, Texas, June 22, 1904 (H. S. Barber); Nanaimo, British Columbia, August 6, 1906 (Dyar and Caudell); Duncans, British Columbia, August 9, 1906 (Dyar and Caudell); Wellington, British Columbia, August 7, 1906 (Dyar and Caudell); Portland, Oregon, July 30, 1906 (Dyar and Caudell); Ashford, Washington, August 5, 1906 (Dyar and Caudell); Chico, California, July 13, 1906 (Dyar & Caudell); Stanford University, California (I. McCracken); Sweetwater Junction, California, June 2, 1906 (Dyar and Caudell); León, State of Guanajuato, Mexico (A. Dugès). Reported also from Chicago, Illinois, and Eastmanville, Michigan (Jordan & Hefferan); St. John, New Brunswick (Coquillett MSS.).

Anopheles punctipennis varies considerably in the extent and clearness of the pale scaling on the wings. Dark specimens sometimes have the minor spots much obscured and it was such a specimen that Ludlow described under the name *perplexens*. One of us has examined the type and found that all the spots exist in their characteristic locations, although some of them are much obscured. We have seen such specimens from widely separated localities, so that they do not even represent a local race but are merely an extreme in the ordinary line of variation.

Theobald reports *Anopheles punctipennis* from Port Antonio, Jamaica, where, he says, it is seemingly rare, and has probably been introduced, as it does not appear to occur elsewhere in the island (Mosq. or Culic. of Jamaica, 12, 1905). We have never received this species from the West Indies and do not believe it occurs there. Dr. Grabham, in response to a query, writes us as follows:

"The specimen from Port Antonio taken by Dr. Mosely, which was said to be *A. punctipennis* Say by Theobald, was sent through me. It was mounted in balsam and very much rubbed and broken. It is quite likely that Theobald has made an error."

The species is listed by Prout as a Jamaican species (Ann. Trop. Med. & Paras., iii, 487, 1909), but his information was furnished by Newstead, who copied from the paper of Theobald.

There is also an earlier Jamaican record by Howard (1900, p. 44), based upon a specimen taken by C. W. Johnson. This specimen, unfortunately, appears to have been lost, but as the determination was made by Coquillett at a time when he had no knowledge of the tropical species, no dependence can be placed upon it. In conclusion it should be noted that the species has not been recorded from Cuba, nor even Florida, territory in which it would be almost sure to occur if present in Jamaica.

ANOPHELES PSEUDOPUNCTIPENNIS Theobald.

Anopheles punctipennis Howard (in part, not Say), U. S. Dept. Agr., Div. Ent., Bull. 25, n. s., 44, 1900.
Anopheles pseudopunctipennis Theobald, Mon. Culic., ii, 305, 1901.
Anopheles pseudopunctipennis Giles, Handb. Gnats or Mosq., 2 ed., 323, 1902.
Anopheles pseudopunctipennis Needham & Cockerell, Psyche, x, 135, 1903.
Anopheles pseudopunctipennis Parker, Beyer & Pothier, Bull. 13, Yell. Fever Inst., U. S. Publ. Health & Mar.-Hosp. Serv., 38, 39, 1903.
Anopheles franciscanus McCracken, Ent. News, xv, 12, 1904.
Anopheles franciscanus Giles, Revis. Anophelinæ, 20, 25, 1904.
Anopheles pseudopunctipennis Giles, Revis. Anophelinæ, 20, 1904.
Anopheles pseudopunctipennis Adams, Kans. Univ. Sci. Bull., ii, 433, 1904.
Anopheles pseudopunctipennis Blanchard, Les Moustiques, 169, 1905.
Anopheles pseudopunctipennis and *franciscanus* Theobald, Gen. Ins., Dipt., 26 fasc., 7, 1905.
Anopheles franciscanus Felt, Bull. 97, N. Y. State Mus., 449, 1905.
Anopheles franciscanus Dyar, Journ. N. Y. Ent. Soc., xiii, 23, 1905.
Anopheles pseudopunctipennis Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 177, 1906.
Anopheles franciscanus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 176, 1906.

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Anopheles pseudopunctipennis and *franciscanus* Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 12, 1906.
Anopheles franciscanus Dyar, U. S. Dept. Agr., Bur. Ent., Circ. 72, 1, 1906.
Anopheles franciscanus Quayle, Bull. 178, Agr. Exp. Sta., Berkeley, Cal., 52, 1906.
Anopheles pseudopunctipennis Theobald, Mon. Culic., iv, 25, 1907.
Anopheles franciscanus Theobald, Mon. Culic., iv, 31, 1907.
Anopheles franciscanus Howard, Osler's Modern Medicine, i, 383, 386, 1907.
Anopheles franciscanus Dyar, Proc. U. S. Nat. Mus., xxxii, 122, 1907.
Anopheles peryvianus Tamayo & Garcia, Los Aguas de Huacachina, Mem. Muncipal. Lima, App-, 35, 1907.
Anopheles pseudopunctipennis Busck, Smiths. Misc. Colls., quart. iss., lii, 57, 1908.
Anopheles pseudopunctipennis Theobald, Mon. Culic., v, 7, 1910.
Anopheles franciscanus Theobald, Mon. Culic., v, 8, 1910.
Anopheles pseudopunctipennis Darling, Stud. Rel. Malaria, Isthm. Canal Comm., 7, 1910.
Anopheles franciscanus Darling, Stud. Rel. Malaria, Isthm. Canal Comm., 8, 1910.
Proterorhynchus argentinus Brèthes, Bol. Inst. Ent. y Patol. Veget., i, 15, 1912.
Anopheles tucumanus Lahille, Anal. Mus. Nac. Buen. Aires, xxiii, 253, 1912.
Anopheles pseudopunctipennis Jennings, Journ. Econ. Ent., v, 134, 1912.
Anopheles pseudopunctipennis Knab, Amer. Journ. Trop. Dis. & Prev. Med., i, 36, 40, 41, 1913.
Anopheles pseudopunctipennis Knab, Rept. First Exp. So. Amer., Harvard Sch. Trop. Med., 212, 216, 1915.

ORIGINAL DESCRIPTION OF ANOPHELES PSEUDOPUNCTIPENNIS:

Wings much as in *A. punctipennis*, Say, but the fringe with yellow spots. Legs long, unbanded, brown, pale at the base. Fore ungues of ♂ unequal, mid and hind equal and simple.

♀. Antennae brown, basal joint testaceous, base of the second joint pale, and also a small pale band at the base of all the following joints; proboscis dark brown, labella yellowish; palpi dark brown, densely scaled at the base, apex yellow, and also two narrow yellow bands below, slightly hairy, hairs black, except at the apex, where they are yellow; clypeus dark brown.

Thorax yellowish-brown (denuded), with a dark patch on each side of the mesonotum behind; metanotum deep brown; pleurae yellowish-brown, with darker brown patches.

Abdomen brown, the segments paler at the base; hairy.

Legs deep brown; coxæ, trochanters and base of femora pallid; knee spot pale; ungues equal and simple.

Halteres with pale stem and fuscous knob.

Wings with two yellowish-white spots on the upper costal border, rest of the edge black, rather densely scaled; first sub-marginal cell longer and narrower than the second posterior cell, its stem nearly as long as the cell; mid cross-vein a little nearer the base of the wing than the supernumerary cross-vein; posterior cross-vein still nearer the base of the wing; scales of the wings disposed as follows:—First long vein with three distinct large white spots, one at the base, one underneath the large costal spot, and one between; second long vein with a dark patch near its base, all the lower branch of the fork-cell dark, and most of the upper; third long vein mostly yellowish-white, with two black patches, one towards the base, the other towards the tip; fourth long vein mostly pale, with two small black patches, branches of the fork-cell all dark scaled; fifth long vein with a black spot near the base, rest mostly yellow, upper branch of the fork mostly dark, a small yellow spot at the apex and another towards its base, lower branch mostly yellowish, with a black apical spot; sixth vein with the basal half creamy, the apical half dark, except a small yellow patch where it joins the wing border; fringe brown, with a yellow spot at the junction of each vein.

Length.—5 mm.

♂. Last two joints of the palpi swollen and clavate, pale, basal joints dark brown, densely scaled with deep brown scales, with a narrow pale band, not quite as long as the thin proboscis, which is brown, with yellow labellae; antennae grey, with narrow brown bands and flaxen brown hairs, the apical joint about half the length of the penultimate joint; basal lobe of the genitalia simple, claspers long and thin; fore ungues unequal, the larger one uniserrated, the smaller minute and simple; mid and hind ungues small, equal and simple.

Wings much as in the ♀, but the fork-cells shorter.

Length.—5 mm., with proboscis 7.5 mm.

Habitat.—Grenada (Dr. Hatton, per Dr. Daniels).

Time of capture.—February.

Observations.—Very like *A. punctipennis*, Say, but can at once be told by the wing fringe being spotted at the apex of each nerve, and by the marking of the sixth long vein. The description is drawn up from two specimens in balsam, so

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that the scale structure is not evident. It is so very distinct, however, that it can easily be identified by the characters given above.

ORIGINAL DESCRIPTION OF ANOPHELES FRANCISCANUS:

Male.—Head dark brown, with short, dark, erect scales toward the nape, emarginate and slightly forked, vertex and anterior part of occiput with short, light brown scales not forked, a tuft of light brown hairs projecting forward between the eyes, a row of similar hairs projecting forward, encircling the eyes posteriorly; eyes deep purplish brown; antennae about two-thirds length of palpi, yellowish-brown hairs, basal joint dark brown; palpi equalling proboscis in length with emarginate scales from base to tip on under and outer surfaces, those upon outer surface dark, upon under surface light, long light hairs covering distal third, becoming short and stout at the apex; a light area at base of three distal segments, giving a slightly banded appearance; two distal joints spatulate, proboscis scaled except labella, labella covered with medium stout setae, a few light hairs at apex.

Thorax; prothorax lobes dark; mesothorax dark brown at the sides, with scattered light hairs, a broad light brown patch in the middle; within this light area a median line and obscure lateral lines; scutellum light with single horizontal row of hairs; metanotum dark without hairs; halteres dark, covered with thick pubescence and emarginate scales; stalks light without scales.

Abdomen, basal area of each segment light, covered sparingly with long, light hairs; two stiff hairs on posterior margin of distal segment, stout hairs on margin of genital lobes.

Legs, coxa and trochanter light; trochanters, femora, tibiae and tarsi covered with short, dark, emarginate scales and setae; ungues of front legs very unequal, the larger one with a large median tooth and a smaller basal lobe; middle ungues curved, with blunt basal lobes; posterior ungues equal, simple; posterior metatarsus slightly longer than tibia.

Wings with dark costa, with two distinct, nearly equal, yellow spots—one at distal end of sub-costal vein, one at and involving distal end of first long vein; fringe dark, with a yellow spot at the end of each vein except at the end of the sixth; the first spot carried on to the first long vein, the apical spot carried past over long vein on to the upper branch of the second long vein; the second long vein dark except for a few basal light scales; third long vein yellow in the middle, dark at the base and apex; light area at base of third long vein carried over the fourth on to the upper branch of the fifth, with a few light scales at base; main branch of fifth long vein light, except at base and apex; distal half of sixth long vein dark, except at apex, basal half light; sub-costal with a light spot carried to the first long vein; (in one specimen the light spot on sub-costal missing); third long vein prolonged slightly into the basal cell; first sub-marginal cell longer and slightly narrower than second posterior cell, stem twice the length of the cell; stem of second posterior cell prolonged to base of wing; supernumerary cross vein adjacent to or but very shortly removed from mid cross-vein and equal to it in length when removed nearer to apex of wing; posterior cross-vein a little longer than mid cross-vein and varying in distance from it from one-half to almost twice its own length; third long vein prolonged slightly into the basal cell, darkest scales on costal, sub-costal and first long veins.

Palpi of the female equalling proboscis in length, light area at base of three distal segments, giving a banded appearance, clothed with scales, short hairs and setae as in male, distal joints not spatulate; legs with the ungues equal; otherwise agreeing with the male.

ORIGINAL DESCRIPTION OF ANOPHELES PERUVIANUS:

Cabeza.—de color general negro, salvo en las regiones post-ocular é inter-ocular; cubierta de pelos blancos y escamas en tornillo y en hoz, que entre los ojos fornan un haz espeso de elementos proyectados hacia adelante. Los bordes posteriores de los ojos, hacia las partes laterales, están ornados de pelos negros y una multiple serie de escamas en tornillo y en hoz de color pardo muy oscuro.

Ojos negros.

Antenas claras, de color pardo, amarillentas en ciertas incidencias de la luz, muy finas, con sedas y pelos negros. Los primeros artículos son menos oscuros que los últimos, cuya coloración es casi negra. Pieza de implantación ligeramente más oscura que el primer artículo, ornada de varias escamas amarillentas, en raqueta.

Palpas muy oscuras, casi negras, un poco más cortas que la trompa, con cuatro artículos, subpenicilares, el último de los cnales adelgazado y de color blanco amarillento. Están en su totalidad cubiertos de escamas filiformes, negras, mucho más marcadas en los artículos proximales. Las extremidades apicales de los apéndices son ligeramente más claras que el resto, y en el último, la zona clara ocupa más la mitad del articulo.

Trompa casi negra; la oliva terminal de color ligeramente amarillento, cubierta de pelos cortos negros. Longitud, 2 mm. 3.

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Torax.—Segmento medio de color blanco, ligeramente amarillento, con tres líneas de ornamentación características (v. figura), poco marcadas en la hembra.

Flancos de color claro, vellosos.

Abdómen.—Pardo muy oscuro, casi negro, ligeramente más claro hacia la extremidad apical de los segmentos.

Miembros.—Patas negras, fémur ligeramente manchado con zonas vagas blancas, más perceptibles en las patas medias; pequeñas zonas claras al nivel de las articulaciones, á expensas de la base de los segmentos del tarso, que en su totalidad está cubierto de escamas muy oscuras.

Fórmula ungueal = 00.00.00.—Grifos muy oscuros de igual longitud.

Alas.—Las nervaduras cubiertas de escamas que, por su acumulación, determinan manchas así dispuestas. la costal se muestra de color negro en los dos tercios internos de su longitud, á partir de la inserción alar, interrumpiéndose la coloración negra al nivel de la unión de los dos tercios internos con el tercio externo, precisamente en el punto donde la sub-costal se une á la costal. Allí las escamas, cambiando de color y haciéndose blanco-amarillentas, de negras que eran, forman una mancha clara de 0 mm. 5, después de la cual continúa la coloración negra hasta la extremidad del ala. La coloración negra intensa de la nervadura costal, sumada á las manchas que presentan las nervaduras sub-costal y mediastina, dan lugar á tres manchas marginales, la primera de las cuales, de menor tamaño y de forma linear, se inicia á 1 mm. 5 á partir del punto de inserción alar, y no comprende en realidad, sino las nervaduras sub-costal y mediastina, mientras que está perceptiblemente separada de la nervadura costal por un espacio linear claro. La segunda mancha, mediana, es, por su longitud, intermedia entre las otras dos, pero es más ancha que todas ellas, llegando, en esta, como en la última, el acúmulo de escamas negras hasta el nivel de la costal, no estando así interrumpida la mancha por el espacio lineal que hemos citado en el anterior. La extremidad externa de esta mancha está, en el macho cortada en bisel agudo hacia abajo y adentro, mientras que en la hembra el bisel es apenas pronunciado.

La tercera mancha, distal ó última, de mayor longitud que las otras, ocupa la extremidad del ala y comprende lá última porción de la costal y de la primera longitudinal, que, convergiendo sobre la anterior, se une en ella en ángulo muy agudo, poco antes de cuyo vértice termina la mancha. Esta comienza bruscamente hacia adentro por el cambio súbito de color de las escamas, que cubren abundantemente las dos nervaduras antes anotadas y terminan del mismo modo; en efecto, el vértice de convergencia de las dos nervaduras está cubierto de escamas de color blanco-amarillento, constituyendo una pequeña mancha clara apical.

Otras dos manchas de menor entidad ocupan, una, la tercera nervadura, inmediatamente por debajo de la primera mancha clara marginal, y la otra, muy pequeña y no constante, en la quinta longitudinal, en el punto donde la transversa media se une á ella; á este nivel la mancha está interrumpida por un menor acúmulo de escamas, que corresponde exactamente al pié de la nervadura transversa ó mediana, que divide así la manchita que señalamos, en dos porciones diferentes.

El ala, en general, tiene un color blanco amarrillo con irisación.

Macho

En general es ligeramente más claro que la hembra.

Cabeza.—Las regiones post é interocular cubiertas de pelo de color blanco argentino.

Antenas.—Plumosas, con pelos de color amarillo parduzco. Los dos últimos artículos, son adornados de pelos cortos y cortas escamas oscuras, son muy largos especialmente el primero, cuya extremidad distal, adelgazada tiene una coloración blanquizca, que continúa en una pequeña extensión de la extremidad proximal del artículo siguiente.

Los otros artículos presentan, además de los verticilos de largos pelos implantados al nivel de las articulaciones, pelos pubescentes que adornan casi la totalidad del artículo, á excepción de una pequeña zona transversal de color claro, situada inmediatamente por encima del verticilo y de la zona muy oscura y muy rica en pelos pubescentes negros, que marca el sitio de este verticilo.

Palpas maxilares.—Son en longitud, sensiblemente iguales á la trompa y en algunos ejemplares la desbordan ligeramente. Los dos últimos artículos son claviformes, de color amarillento, más oscuro que en la hembra; estando marcada la articulación que los separa por un semianillo de color negro que abraza, transversalmente los 3/4 de la extremidad distal del penúltimo artículo, quedando solo libre el 1/4 dorsal.

Al nivel de la unión de este artículo con el primero hay un haz de pelos muy largos distribuidos en la mitad ventral de la articulación y sobre el primer artículo.

La base de las palpas está cubierta de escamas alargadas muy oscuras, que le dan una coloración más marcada que los artículos terminales.

Trompa.—Muy oscura cubierta en la base de escamas alargadas muy negras.

Torax.—Más blanco que en la hembra y con la ornamentación linear más marcada.

Balancines En ambos sexos de color pardo oscuro, adornados de algunas escamas oscuras en la extremidad ensanchada.

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Abdomen.—Armadura genital de forma característica, con ganchos muy desarrollados.

Fórmula ungueal.—

Epoca de captura.—En Huacachina: larvas, ninfas y raros insectos perfectos en el mes de julio de 1906. En San Pedro de Lloc en el mes de febrero de 1904. En Lima y sus alrededores, principalmente en Verano y Otoño. En Chanchamayo en enero y febrero de 1907 (probablemente todo el año).

Clasificación.—Esta especie ha sido considerada en el género Anopheles, obstantes los haces que presentan lateralmente los segmentos medios del abdomen en la larva que haría pensar en el género nyssornychus de Blanchard ó *Laveriana* Theobald, fundándonos: 1°. que estos haces de escamas no existen en el imago en ninguno de los ejemplares que cuidadosamente hemos observado; 2°, en que las palpas maxilares no son densamente escamosas y 3°, en que las patas no presentan las manchas y anillos blancos propios de los *Nyssorhynchus.*[*]

Cabe preguntar aquí si esta especie, que marca el lazo de unión entre los géneros Anopheles y Nyssorhynchus, siendo intermediaria entre ambas, debe servir para constituir un nuevo género ó asimilarse, como lo hemos hecho, aquel de los géneros ya establecidos que le sea más semejante. Cremos que no hay derecho para el establecimiento de un nuevo género simplemente caracterizado por la existencia de los haces de escamas en el abdomen de las larvas.

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[*] Gastiaburú también la considera como especie distinta, habiendo propuesto para designarla el nombre de anofeles multimaculatíes, que no lo ha conservado en la descripción que de ella hace en su tésis.

ORIGINAL DESCRIPTION OF PROTEROSHYNCHUS ARGENTINUS:

♀ *Piceo-testaceus; thorace supra longitrorsum ample griseus, utrinque longitrorsum obscure piceus, e squamis auratis, antice maniculo albo ornato; capite nigro-squamato, in medio albescente-squamato; palpis nigro-squamatis, articulis imo apice albo-ciamque articulo ultimo toto albo-squamatis; proboscide palpis aequelonga, picea; abdomine haud appresse aurato-piloso; alis hyalinis, costa fusco-3-maculata, squamis elongato-lanceolatis; squamis albis sunt: in costa tertio apicali et vix ante apicem; vena subcostali bis;* 1ª. *longitudinali quater;* 2ª. *longitudinali a basi et rama superiore ante apicem;* 3ª. *longitudinali in medio late et basi;* 4ª. *longitudinali in medio paulum;* 5ª. *pedicello vix toto, rama superiore prope basin, rama postica tota, apice excepto;* 6ª. *longitudinali dimidio basali; margine alarum ad apicem venarum; pedibus piceis, haud albo-annulatis. Long.* (*proboscide excepta*): 6 *mm.*

♂ *A* ♀ *differt: antennis plumosis, palpis articulis* 2 *ultimis incrassatis, pedibus anticis unguibus inaequalibus: una magna, subtus unidentata, altera minuta.*

♀ De un color de pez claro; el tórax por arriba tiene una ancha y larga faja gris, interrumpida un poco después del medio por una línea obscura; en los lados el tórax tiene una faja obscura bien característica; el dorso del tórax tiene una que otra escama piliforme y dorada y en su borde anterior un mechón de escamas blanquizcas. La cabeza tiene escamas negras en tornillo y en la línea mediana tiene escamas blancas que se alargan sin tener sin embargo la forma de pelos; uno que otro pelo esparcidos entre las escamas. Los palpos son negros y le extremidad de cada artículo y el último entero tienen escamas blancas; la trompa es tan larga como los palpos, picea. El abdomen tiene solamente pelos no muy densos y de color dorado. Las alas son hialinas con tres o cuatro manchas; las escamas son lanceolo-alargadas; hay grupos de escamas blancas en: la costa, en su tercio apical y cerca de la extremidad; la vena subcostal, dos veces; 1ª. longitudinal, 4 veces; 2ª. longitudinal en la base y en la rama superior antes de la extremidad; 3ª. longitudinal, en el medio y en la base; la cuarta longitudinal un poco en el medio; la quinta, el pedicelo casi todo, en la rama superior cerca de la base y en la rama posterior, excepto en la extremidad; la sexta longitudinal en su mitad basal; el borde alar en la extremidad de las venas; los pies son negruzcos sin anillos claros; largo (sin trompa): 6 mm.

♂ El macho difiere de la hembra por las antenas plumosas, los dos últimos artículos de los palpos engrosados; los pies anteriores con una uña grande, provista de un diente por debajo y otra uña diminuta, simple.

El Museo Nacional posee une serie de estos Anophelinos; pero como vinieron en alcohol, se encuentran muy estropeados; uno que otro y sobre todo una ♀, que me ha cedido galantemente el Doctor Don F. Lahille, y una segunda ♀ que amablemente me mandó de Tucumán el Ingeniero Agrónomo, Sr. Don Juan J. Chavanne, me han permitido dar la descripción completa de la especie.

Es esta especie, a no dudarlo, la causante del chucho en las provincias del Norte Tucumán, Salta, Jujuy y Santiago del Estero.

ORIGINAL DESCRIPTION OF ANOPHELES TUCUMANUS:

La cabeza es oscura y presenta alrededor de los ojos unas cerdas negras, curvas, dirigidas hacia adelante. En el vértice se notan escamas de un color blanco que van

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transformándose poco a poco hacia adelante y entre los ojos en escamas piliformes. De ambos lados de las escamas blancas se ve atrás de la cabeza escamas negras.

Los ojos están rodeados, en su parte superior, de una línea blanca muy fina, que no hay que confundir con el reflejo brillante de la última hilera de ommatos.

Los palpos maxilares son de un marrón muy oscuro, así como la trompa, pero la labela y sobre todo el último artejo de los palpos maxilares son de un color leonado.

Al nivel de las articulaciones distales de estos palpos se nota unos pocos pelos, leonados también, pero éstos no llegan a formar verdaderos anillos.

El cuadro siguiente indica el largo absoluto y centesimal de los cinco artejos de los palpos. El largo total de éstos es de 2,7 mm, casi igual al largo del tórax y cabeza reunidos (2,5 mm).

En cuanto al abdomen, su largo es de 3,5 mm.

Palpo maxilar	Medida absoluta	Medida %
Palpito		
π_1 (proximal)	250 μ	9
π_2	700 μ	25
π_3	1000 μ	36
π_4	550 μ	20
π_5	270 μ	10
Largo total	2770 μ	100

El escudo torácico ó mesonotum, presenta lateralmente dos fajas anchas, de un negro aterciopelado. Arriba su color es de un gris verdoso adornado de dos fajas morenas, encorvadas, muy distintas en la parte anterior.

El medio del tórax está marcado por una línea longitudinal cuya visibilidad varia mucho según la incidencia de la luz. Se ensancha un poco atrás prolongándose sobre el escutelo y dibuja allí una mancha negruzca. Los lóbulos protoráxicos no son mamelóneos.

Todo el tórax así como el escutelo está revestido de pelos curvos que parecen dorados a la luz. Son muy cortos encima del tórax y largos sobre los costados. En la parte anterior y media del meso tórax existe un manojo de escamas piliformes blancas. Las antenas son de un color marrón y presentan además de los pelos largos verticilados, un revestimiento bastante denso de pelos finos y cortos. El abdomen cilíndrico, negro, sin ninguna escama propiamente dicha, está adornado de pelos largos que parecen dorados cuando se miran á una luz fuerte.

Las alas, de un largo de 5 mm, son hialinas, salvo en los tres puntos en que existen las escamas más negras. Allí son levemente ahumadas; tienen una nervadura costal negra interrumpida por una sola mancha amarilla dorada, situada a la altura del origen de la horquilla superior. Todas las escamas son largas y lanceoladas.

El dibujo adjunto indica además mejor que cualquier descripción la forma de estas escamas y la disposición de las zonas negras y amarillas de las alas y del flejo.

Las escamas alares representan sobre todo el adorno de estos órganos, pero las nervaduras constituyen su armazón característico. Por lo tanto, creo que si bien las escamas proporcionan a la sistemática facilidades para las determinaciones, es bueno también tener en cuenta la estructura más íntima del ala y expresar el valor centesimal de las medidas más importantes que la caracterizan.

En mi trabajo de 1904 (Notes sur la classification des moustiques), indiqué en la figura 3, las medidas que conviene calcular, en proyección sobre una línea paralela a la nervadura costal, para expresar estos valores numéricos. El esquema adjunto que representa un ala de *Anopheles tucumanus* ♀ las recuerda.

Aplicando este procedimiento a dicha especie, si representamos por (L) el largo total del ala, contado desde su punta hasta la unión del lóbulo basilar (LB) con el lóbulo articular (LA) obtendremos los resultados siguientes:

L, largo total 100
H, ancho máximo 25,9
fs, vértice de la horquilla pequeña superior 27,8
fi, " " " " inferior 23,1
l_2, unión de la 2a. longitudinal inferior con el borde alar 45,7
L_2, " " " " superior " " " 38,1
Tm, unión de la axial con la transversal media, superior é inferior 43,8
Ti, " " transversal inferior con la 4a. longitudinal inferior 47,1
Ts, " " " superior " 3a. " superior 58,5
Fi, vértice de la horquilla grande inferior 59,4

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Para hacer resaltar las medidas de los puntos simétricos ó correspondientes se podría adoptar la disposición siguiente, suprimiendo los decimales por ser ilusoria tal precisión en medidas que tienen que variar forzosamente, entre ciertos límites a determinar en cada caso:

Fórmula $\frac{L - Ts - Tm - L' - fs}{H - Fl - Tl - ll - fl}$ $\frac{100 - 58 - 44 - 38 - 28}{26 - 59 - 47 - 46 - 23}$ Ala de *A. tucumanus* ♀

Agregaré de paso que las antenas del mismo ejemplar median 3mm7 de largo y sus artejos ó antenitos tenían estas dimensiones:

a_1	0 mm 11	a_6 hasta a_{11}	0,28
a_2	0,33	a_{12}	0,20
a_3	0,22	a_{13}	0,27
a_4 y a_5	0,25	a_{14}	0,30

Las patas del primer par tenían un largo total de 11mm7; las del segundo 13mm8 y las del tercer 16mm7.

Los balancines del *A. tucumanus* son de color blanco y su dilatación terminal es negra.

Las patas tienen un color uniforme moreno negruzco con algunos pelos de color leonado en las articulaciones, pero no hay rastros de anillos blancos.

La coxa y el trocánter de los pares de patas 2 y 3, son transparentes casi hilianos; los de las patas primeras presentan en su cara anterior pelos oscuros.

El cuadro adjunto da las dimensiones de los artejos de los tres pares de patas. Las uñas como de costumbre, en este género Anopheles, son simples y relativamente cortas.

Artejos.	Patas		
	1er Par (P_1)	2° Par (P_2)	3er (P_3)
Protopodito..... p_1 (coxa)	0,2	0,2	0,2
Deutopodito ..... p_2 (Trochanter) ..	0,2	0,1	0,1
Tritopodito ..... p_3 (femur)	2,2	2,5	2,7
Tetrapodito..... p_4 (tibia)	2,6	2,7	2,8
Pentapodito..... p_5 (metatarso) ...	1,9	2,1	3,4
Hexapodito ..... p_6 ($_1$ tarsiano)....	0,8	0,9	2,2
Heptapodito ..... p_7 ($_2$ tarsiano) ...	0,5	0,6	1,1
Ennapodito ..... p_8 ($_3$ tarsiano)....	0,3	0,4	0,5
Decapodito ..... p_{10} ($_4$ tarsiano)...	0,2	0,2	0,3
Onichopodito.....	0,5	0,5	0,05
Largo total	8,82 mm	9,75 mm	13,35 mm

DESCRIPTION OF FEMALE, MALE, AND LARVA OF ANOPHELES PSEUDOPUNCTIPENNIS:

Female.—Proboscis moderate, rather slender and smoothly scaled, uniform, labellæ long, lanceolate, luteous, with fine outstanding black setæ; vestiture black. Palpi as long as proboscis, roughened by erect elliptical scales toward base, black, with a tuft of setæ at tip, last joint shining whitish, a small white ring at base and apex of penultimate joint, long joint with a white ring near middle. Antennæ moderate; joints subequal, short, blackish, densely pilose; hairs of whorls black, short; tori subspherical, with a cup-shaped apical excavation, blackish without, rim luteous. Clypeus rounded triangular, blackish, nude. Eyes well separated on the vertex, black. Occiput with a median groove, dark

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brown, scales dense, elongate, triangular, erect, black at the sides, broadly white on the vertex, a large tuft of white hairs and hair-scales between the eyes projecting forward; a row of black setæ along the margins of eyes.

Prothoracic lobes lateral, prominent, with blackish bristles. Mesonotum narrow, elongate, dark brown on the sides, pale brown and with pale blue-gray pruinosity in a broad median stripe; vestiture of numerous short pale yellowish hairs and many very narrow white scales on anterior fourth of median stripe, blackish hairs on the sides. Scutellum collar-like, grayish brown, with pale brown marginal bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ dark brown, coxæ lighter, with a few fine hairs.

Abdomen subcylindrical, depressed, truncate at tip, brownish black; vestiture of rather long, fine pale hairs arising from small black punctures.

Wings (plate 41, figs. 13 and 18) moderate, hyaline; second marginal cell longer than its petiole, second posterior cell distinctly shorter than its petiole; basal cross-vein distant about its own length from anterior cross-vein; scales of the veins narrowly lanceolate to broadly linear, dense, outstanding, black and yellowish white, the black predominating, a large patch of white scales at outer third of costa and involving first vein, a similar one just before wing-apex involving also upper branch of second vein, a smaller one at extreme apex and on the fringe, first vein with two long white patches on basal half, third vein with a small white patch at base and a very long one at middle, fourth vein with the stem mostly white scaled, fifth vein largely pale-scaled, a black spot near base and another close to tip of lower fork, the upper fork black scaled, a spot toward base and extreme base and apex white scaled, sixth vein with the basal half pale, apical half black; fringe with large pale spots at tips of all the veins. Halteres whitish, with brown knobs.

Legs long and slender; vestiture brownish black, tips of femora and tibiæ narrowly whitish. Claw formula, 0.0–0.0–0.0.

Length: Body about 5 mm.; wing 4.5 mm.

Male.—Palpi as long as the proboscis; last two joints short, swollen, club-shaped, with many long yellow silky hairs; vestiture of last two joints yellowish white, a black ring at the last articulation, long joint brown with a pale ring near middle. Antennæ rather stout, plumose; last two joints long and slender, rugose, black, pilose, the others short, pale, with black basal rings; hairs of whorls long, dense, brown with silky luster. Coloration as in the female. Abdomen elongate, depressed, brown above, the bases of the segments broadly pale, each with a small median elongate shining brown basal spot; lateral ciliation irregular, pale brown. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture more sparse. Claw formula, 2–0.0–0.0.

Length: Body about 4.5 mm.; wing 4 mm.

Genitalia (plate 40, fig. 265): Side-pieces about twice as long as wide, conical, bearing a moderately stout spine beyond middle of inner margin; at base two spines from a common base, two other spines arising from a detached conical piece. Clasp filament as long as side-piece, slightly enlarged at base and apex, with a small articulated terminal spine. Unci slender, columnar, short, rounded at tip.

Larva, Stage IV.—Head rounded, elongate, bulging at sides, frontal portion before antennæ conically produced; both pairs of dorsal head-hairs single but numerously branched, in a line between antennæ, a smaller hair at base of antenna; two long approximate spines on front margin. Antennæ subcylindrical, slightly tapered, spined all over; a single smooth hair toward base; two long terminal processes, a slender hair-tuft and a small digit at tip. Eyes large, pointed. Mental plate small, with a median tooth and four on each side, rather evenly spaced, the fourth small. Mandible quadrangular; a basal row of slender filaments, becoming short outwardly; two filaments and two branched ones before tip; an outer row of cilia; five feathered filaments on outer margin; dentition heavy, six teeth on a process, the third longest, a stout tooth below followed by a small group of confluent spines; a serrate filament within; basal

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angle rounded, with a small tuft of hair; a row of long basal hairs. Maxilla rounded rectangular, with slightly concave center, margin and center fringed with coarse hairs; palpus large, slightly serrate without, with a large dendritic tuft, a terminal group of digits and leaf-like appendages. Thorax rounded quadrate, about as wide as long; hairs short, consisting of branched hairs, single hairs and tufts, mesothorax sparsely haired. Abdomen stout, anterior segments shorter; long, feathered lateral hairs on first three segments, double on first and second, single on third; posterior hairs small, smooth; a dorsal series of five pairs of fan-shaped tufts on third to seventh segments (plate 130, fig. 454). Air-tube sessile, subquadrate, roundedly angled posteriorly. Lateral plates of eighth segment posteriorly with a series of spines, long and short ones irregularly disposed, the short ones from one-third to nearly half as long as the long ones. Anal segment about as long as wide, with a small dorsal plate; dorsal brush a long hair and a short tuft on each side; a single long lateral hair below the plate; ventral brush well developed, of long branched tufts. Anal gills moderate, about as long as the segment, blunt pointed.

Miss McCracken found the larvæ in an irrigating ditch and in a pool formed by the overflow of a watering trough, both being clear quiet pools. Dr. Dyar found them in ground-pools. Mr. Jennings found them in ditches, pools and puddles and in pools near streams and in the edges of streams; also in a tank. Mr. Knab got them in pools along a stream, in well-holes on a bare hill-top and in a spring-hole full of algæ. Mr. Jennings gives the following notes on his observations in the Panama region:

"It occurs abundantly from ocean to ocean but is somewhat more discriminating than the latter [*Anopheles albimanus*] in choice of breeding place. It prefers as a rule water of greater purity and rapidity of current. The larval food, like that of *albimanus*, is by preference the soft green algæ, though it does not scorn, lacking better, many places departing quite widely from the chosen type. At times the abundance is enormous, though usually far fewer of this species will find their way into buildings than is the case with *albimanus*, and its flight is less vigorous."

Semi-arid portions of the tropical and subtropical American continent; southwestern United States to northern Argentina.

Stanford University, California (I. McCracken); Stockton, California (H. J. Quayle); Sweetwater Junction, California, June 2, 1906 (Dyar and Caudell); Tia Juana, Baja California, Mexico, June 2, 1906 (Dyar and Caudell); Las Vegas Hot Springs, New Mexico, 1902 (T. D. A. Cockerell); Devil's River, Texas, May 5, 1907 (F. C. Pratt); Brownsville, Texas, May 31, 1904 (H. S. Barber); Monterey, Mexico (McMean); Tampico, Mexico, September 3, 1902 (J. Goldberger); Córdoba, Mexico, January 6, 1908 (F. Knab); Salina Cruz, Mexico, July 9, 1905 (F. Knab); Rincon Antonio, Mexico, June 24, 1905 (F. Knab); Chiquimula, Guatemala, December 17, 1915 (R. Morales); Bluefields, Nicaragua (W. F. Thornton); Port Limon, Costa Rica (R. L. Turner); Tabernilla, Canal Zone, Panama, April 26, 1907 (A. Busck); Empire, Canal Zone, Panama, May 6, 1907 (A. Busck); Culebra, Canal Zone, Panama, May 7, 1907 (A. Busck); Rio Chagres, Panama, June 6, 1907 (A. Busck); Las Cascadas, Canal Zone, Panama, June 8, 1907 (A. Busck); Gatun, Canal Zone, Panama, June 8, 1907 (A. Busck); Pedro Miguel, Canal Zone, Panama, November 18, 1907 (A. H. Jennings); Cartagenita, Paraiso District, Canal Zone, Panama, November 16, 1907 (A. H. Jennings); Ancon, Canal Zone, Panama, November 23, 1907 (A. H. Jennings); Bas Obispo, Canal Zone, Panama, February 26, 1908 (A. H. Jennings); Matachin, Canal Zone, Panama, February 26, 1908 (A. H. Jennings); Cocoli River, Canal Zone, Panama, May 5, 1908 (A. H. Jennings); La Boca, Canal Zone, Panama (A. H. Jennings); Taboga Island, Panama Bay, Panama (A. H. Jennings); Miraflores Barracks, Canal Zone, Panama, May 13, 1906 (A. H. Jennings); Santa

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Marta, Colombia, February, 1913 (J. H. Egbert); Verrugas Cañon, Peru, July 9, 1913 (C. H. T. Townsend); San Bartolomé, Peru, April 16, 1913 (C. H. T. Townsend). Reported also from Grenada [? Nicaragua] (Theobald); Vera Cruz, Mexico (Parker, Beyer & Pothier); Oak Creek Canyon and Bill Williams Fork, Arizona (C. F. Adams); Huacachina, San Pedro de Lloc, Lima and Chanchamayo, Peru (Tamayo & Garcia); Provinces of Jujuy, Salta, Tucumán and Santiago del Estero, Argentina (Brèthes).

Anopheles pseudopunctipennis was first described from a specimen said to come from Grenada. This record has been generally supposed to refer to the West Indian island of that name, but we have received no specimens from the Antilles nor have they been reported by others and we are forced to believe that it does not occur there. We think it highly probable that Theobald's specimen came from Grenada in Nicaragua. *Anopheles franciscanus* differs slightly, the fourth vein being dark scaled (plate 41, fig. 13), whereas it is whitish before the fork in typical *pseudopunctipennis* (plate 41, fig. 18). This form (*franciscanus*) is the usual one in the northern part of the range of the species, but it is gradually evanescent in more southern localities. We have seen many specimens which are intermediate in this respect and have intergradient specimens from the same rearings in Panama. We are satisfied that the difference, so far as it exists, is not of specific value, but only a slight variation.

ANOPHELES CRUCIANS Wiedemann.

Anopheles crucians Wiedemann (in part), Ausser. Zweifl. Ins., i, 12, 1828.
Anopheles crucians Howard, U. S. Dept. Agr., Div. Ent., Bull. 4, n. s., 23, 1896.
Anopheles crucians Coquillett, U. S. Dept. Agr., Div. Ent., Circular 40, 2 ser., 4, 1900.
Anopheles crucians Howard, U. S. Dept. Agr., Div. Ent., Bull. 25, n. s., 21, 44, 1900.
Anopheles crucians Giles (in part), Handb. Gnats or Mosq., 165, 1900.
Anopheles crucians Howard, Mosquitoes, 113, 240, 1901.
Anopheles crucians Beyer, N. Orleans Med. & Surg. Journ., liv, 147, 1901.
Anopheles crucians Veazie, N. Orleans Med. & Surg. Journ., liv, 163, 1901.
Anopheles crucians Theobald, Mon. Culicid., i, 204, 1901.
Anopheles crucians Giles, Handb. Gnats or Mosq., 2 ed., 324, 1902.
Anopheles crucians Dyar, Proc. Ent. Soc. Wash., v, 46, 1902.
Anopheles crucians Pazos, Rev. de Med. Trop., iv, 164, 1903.
Anopheles crucians Pazos, Bull. Soc. Ent. France, 1904, 134, 1904.
Anopheles crucians Smith, Ent. News, xv, 150, 1904.
Anopheles crucians Giles, Rev. Anophelinæ, 21, 24, 1904.
Anopheles crucians Felt, Bull. 79, N. Y. State Mus., 270, 1904.
Anopheles crucians Smith, N. J. Agr. Exper. Stat., Bull. 171, 30, 1904.
Anopheles crucians Blanchard, Les Moustiques, 171, 1905.
Anopheles crucians Dyar, Journ. N. Y. Ent. Soc., xiii, 186, 1905.
Anopheles crucians Smith, Rept. Mosq. N. J., 169, 1905.
Anopheles crucians Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 177, 1906.
Anopheles crucians Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 7, 12, 1906.
Anopheles crucians Ludlow, Can. Ent., xxxviii, 296, 1906.
Anopheles crucians Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 1, 1906.
Anopheles crucians Howard, Osler's Modern Medicine, i, 378, 383, 385, 1907.
Anopheles (?) crucians Theobald, Mon. Culic., iv, 29, 1907.
Anopheles crucians Viereck, 1st Ann. Rept. Comm. Health Pa., 469, 1908.
Anopheles crucians Pazos, San. y Ben., 45, 183, 1909.
Anopheles crucians Thibault, Proc. Ent. Soc. Wash., xii, 24, 1910.
Anopheles crucians Theobald, Mon. Culic., v, 15, 1910.
Anopheles crucians Morse, Ann. Rept. N. J. State Mus., 1909, 716, 1910.
Anopheles crucians Smith, Rept. N. J. Agr. Coll. Exp. Stat., 1910, 424, 1911.

ORIGINAL DESCRIPTION OF ANOPHELES CRUCIANS:

Fuscanus; thorace lineis tribus saturatioribus; abdomine griseo hirto; alis costa maculaque fuscis. Bräunlich; Rückenschild mit drei dunklern Linien; Hinterleib greisbehaart; Flügel mit brauner Rippe und Flecken.—2½ Linien.—Aus Pensylvanien und Neu-Orleans; am Mississippi sehr häufig und den Reisenden beschwerlich.

Thom. Say Journ. Acad. Philad. 1822. 9, 1: Cul. punctipennis.

Fühler braun; Taster bräunlich schwarz, Glieder an der Wurzel wenig schneeweiss. Rückenschild rothbräunlich, mit drei schwärzlichbraunen Linien, deren mittelste viel feiner ist; Zwischenräume in gewisser Richtung weisslich; Hinterrücken mit schwärzlich brauner Strieme. Hinterleib gleichförmig braun, greisbehaart. Flügel

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an der Rippe gleichförmig, übrigens fleckenweise braunschuppig, an den Adern hin und wieder weiss; in der Ruhe, wo die Flügel auf einander liegen, sieht man jenseits der Mitte eine blasse Binde, die an den einzelnen Flügeln wenig oder gar nicht bemerkbar ist. Schwinger gelblich mit braunem Knopfe. Beine gelbbräunlich mit bräunlichschwarzen Fusswurzeln.—In von Winthems und meiner Sammlung.

DESCRIPTION OF FEMALE, MALE, LARVA, AND EGG OF ANOPHELES CRUCIANS:

Female.—Proboscis moderate, rather slender and roughly scaled; labellæ long, lanceolate, with fine outstanding setæ; vestiture black. Palpi as long as the proboscis, clothed with black scales, roughened and erect toward base, last joint and extreme apex of penultimate joint pure white scaled, a narrow white ring at base of penultimate joint and another beyond middle of long joint. Antennæ moderate, the joints subequal, rather short, blackish, densely pilose; hairs of whorls short, sparse, black; tori small, subspherical, with a cup-shaped apical excavation, brown, with a few pale scales on one side. Clypeus rounded triangular, brownish, pruinose, nude. Eyes well separated on the vertex, black. Occiput with a median groove, blackish, the scales dense, elongate triangular, erect, black, except on the vertex where they are white, a tuft of long white hairs projecting between the eyes; a row of black setæ along margins of eyes.

Prothoracic lobes small, lateral, bearing black hairs. Mesonotum narrow, elongate, gray pruinose, with two narrow, bare impressed lines on anterior half of disk, a pair of much broader bare stripes well outward on posterior half, these stripes and sides of disk brownish, some brown mottlings on lateral portions; vestiture of numerous short yellowish hairs intergrading with narrow white scales at anterior end, some black setæ laterally. Scutellum collar-like, gray pruinose, clothed with pale hairs and brown marginal bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ and coxæ brown, gray pruinose, spotted with black, with a few short hairs.

Abdomen subcylindrical, depressed, tip subtruncate; black, slightly pruinose; vestiture of abundant, rather coarse, yellowish hairs on the disk, longer brown ones on the sides.

Wings (plate 41, fig. 1) moderate, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell hardly longer than its cell; basal cross-vein close to anterior cross-vein; scales of veins rather narrowly lanceolate, dense, outstanding, brownish black and dull white, the black predominating; a white spot before middle of first vein, a pale yellow spot at tip of wing involving tips of first vein and of upper branch of second, a white spot on second vein just before the fork, fourth vein white scaled at base of fork and on middle of both its branches, fifth vein broadly whitish scaled at middle of upper branch and base of lower, sixth vein whitish scaled and with three distinct black patches. Halteres pale, with black knobs.

Legs long and slender, brownish black, the tips of femora and tibiæ very narrowly pale. Claw formula, 0.0–0.0–0.0.

Length: Body about 5 mm.; wing 5 mm.

Male.—Palpi as long as the proboscis, tip of long joint and last two joints swollen, club-shaped, dark haired above, beneath with long, dense, yellowish silky hairs; scale vestiture brown, extreme apex and base of second joint white scaled. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, pale, with black basal rings; hairs of whorls long, dense, brown with silky luster. Coloration as in the female. Abdomen long, depressed, above brownish gray, a series of median, basal, shining black spots on all the segments; lateral ciliation long but rather sparse, brown. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture more sparse. Claw formula, 2–0.0–0.0.

Length: Body about 5 mm.; wing 4.5 mm.

Genitalia (plate 40, fig. 269): Side-pieces about twice as long as wide, conical, a stout spine arising from middle of inner margin, at base two stout spines arising from a tapered common base, basally on inner margin two stout spines inserted upon unequal conical prominences. Clasp-filament long and

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slender, nearly as long as side-piece, slightly enlarged at base and apex, with a short articulated terminal spine. Unci slender, columnar, with two tufts of spines at tips projecting at right angles.

Larva, Stage IV.—Head rounded, elongate, bulging at the sides, frontal portion before antennæ conically produced; dorsal head-hairs single but numerously branched, in a line between antennæ, a smaller hair at base of antennæ; two long approximate setæ on front margin. Antennæ subcylindrical, slightly tapered, spined on one side, a tuft of four hairs at basal fifth; two long dentate articulated terminal processes, one small one and a small hair-tuft. Eyes large, pointed. Mental plate small, slightly tapered, with a median tooth and four on each side, first and second subequal and approximate, third distant, fourth small. Mandible quadrangular, convex without; eight large branched hairs on dorsal aspect in a line, two smaller ones near them; two pairs of flat appendages near tip, the distal pair feathered; an outer row of cilia; terminal dentition of thirteen teeth, upper two large, third prominent and bearing the fourth, fifth, and sixth on its lower declivity, the other teeth small; two filaments above, three within; a square spinose dentate process below; a thick process at end of dentition, one at base, between these processes a row of setæ, the central ones longest. Maxilla rounded rectangular, palpus attached by a narrow constriction; numerous setæ and spines on inner aspect, those at the angles rather long; palpus with round projecting base, a dendritic tuft within, five terminal digits and two flattened appendages. Thorax rounded quadrate, about as long as wide; hairs short, consisting of branched hairs, single hairs and tufts, mesothorax sparsely haired. Abdomen stout, anterior segments shorter; long feathered lateral hairs on first three segments, double on first and second, single on third; posterior hairs small, smooth; a dorsal series of five pairs of fan-shaped tufts on third to seventh segments (plate 130, fig. 452), the first and fifth smaller than the others. Air-tube sessile, subquadrate, roundedly angled posteriorly. Lateral plates of eighth segment posteriorly with a series of spines, about eight long stout ones, separated from each other by from one to four short spines. Anal segment about as long as wide, with a small dorsal plate; dorsal brush a long and a short tuft on each side; a single long lateral hair below the plate; ventral brush well developed, of long branched tufts; anal gills moderate, about as long as the segment, slightly constricted centrally, blunt pointed.

Egg (plate 147, fig. 696 *).—Elongate fusiform, slightly more tapered toward one end, both ends rounded; dorsal surface granular, ventral surface coarsely hexagonally reticulate; floats occupying about half the sides in top view, separated at the middle by nearly one-third the diameter of the egg.

The eggs are laid singly, a small number at a time, upon the surface of the water. The larvæ live in ground-pools, usually in tidal marshes. Smith, in New Jersey, found that the species breeds upon the salt marsh, but whether in water of saline content is not stated. Dyar found the larvæ in a dirty pool in the bed of a small stream a few feet from where it emptied into salt water, although the pool itself was fresh. Breeding occurs also inland, but the majority of our captured adults, and all of our larvæ, come from the vicinity of the sea coast. Below New Orleans Doctor Beyer found this mosquito "an abundant pest in the salt and brackish water marshes along the lake shores east of the river, where they occur throughout the year, not even diminishing in numbers during freezing weather, as all duck hunters have experienced to their discomfort while in their blinds among the tall grasses of the prairie." Smith states that the females bite both at night and by day, "long before dusk and long after sunrise." He says they readily enter dwellings, and at Cape May, New Jersey, were the most annoying indoor mosquito. Doctor Dyar took specimens in the house at Bellport, New York, and his experience agrees with that of Professor Smith, as whenever a mosquito was taken in the house it was more apt to prove this species than any other. Both localities are on the sea shore.

* The figure shows the dorsal aspect of the egg, not the ventral as stated on the plate.

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Southeastern United States from New York to Texas; Cuba and Jamaica.

Bellport, New York, October 13, 1901 (H. G. Dyar); Chesapeake Beach, Maryland, July 4, 1903 (A. Busck); Ocean City, Maryland, September 14, 1913 (H. G. Dyar); Laurel, Maryland, July, 1903 (M. W. Lyon, Jr.); Woodbine, Maryland, August, 1901 (J. Kotinsky); Piney Point, Maryland (T. Pergande); District of Columbia, April 27, 1893 (T. Pergande); Virginia Beach, Virginia, September 20, 1911 (H. G. Dyar); Richmond, Virginia (Mrs. A. T. Slosson); Lake Drummond, Virginia, October 29, 1906 (H. S. Barber); Hendersonville, North Carolina, March 24, 1913 (W. B. W. Howe); Columbia, South Carolina, September 12 (W. H. Sligh); McClellanville, South Carolina, October 12, 1906 (———); Melbourne, Florida, March 4, 1901 (L. A. Peek); West Palm Beach, Florida, March 14, 1905 (Dyar and Caudell); Spring Grove, Florida, September 20, 1901 (A. O. Hiscock); Lake Okeechobee, Florida, August, 1906 (J. H. Egbert); Estero, Florida, June, 1906 (J. B. Van Duzee); Jacksonville, Florida, March 4, 1905 (H. G. Dyar); Kissimee, Florida, February 18, 1906 (J. H. Egbert); Sanford, Florida, March 17, 1905 (Dyar and Caudell); Tampa, Florida, larvæ, March, 1905 (H. G. Dyar); Fort Myers, Florida, March 18, 1905 (A. N. Caudell); Arcadia, Florida, March 19, 1905 (A. N. Caudell); Lake Catherine, Louisiana, June 8, 1901 (G. E. Beyer); New Orleans, Louisiana, June 28, 1900 (H. A. Veazie); Jackson Barracks, Louisiana, May 13, 1906 (Captain Chamberlain); Biloxi, Mississippi, December 6, 1902 (J. Brodie); Buena, Texas, November 14, 1902 (A. D. Hopkins); Galveston, Texas, September 30, 1901 (I. T. Moore); Tyler, Texas, February 20, 1907 (A. Woldert); San Antonio de los Baños, Cuba (J. H. Pazos); Cayamas, Cuba, June 5 (E. A. Schwarz); Spanish Town, Jamaica, January, 1910 (Dr. Neish, through M. Grabham). Reported also from Cape May (Smith), Elizabeth, Manumuskin, Delair and Lahaway, New Jersey (Moore); Scott, Arkansas (Thibault).

Wiedemann, in the original description of *Anopheles crucians*, confused the species with *A. punctipennis*, but the type in the museum at Vienna agrees with the species as here considered. Dark colored specimens occur in which the lighter maculations of the wings are very inconspicuous and can only be detected by close scrutiny. Such specimens are likely to be mistaken for *Anopheles quadrimaculatus*, on account of the denser accumulation of black scales at the cross-veins and at the bases of the fork-cells.

ANOPHELES OCCIDENTALIS Dyar & Knab.

Anopheles maculipennis Theobald (not Meigen), Can. Ent., xxxv, 211, 1903.
Anopheles maculipennis McCracken (not Meigen), Ent. News, xv, 9, 1904.
Anopheles maculipennis Dyar (not Meigen), Proc. Ent. Soc. Wash., vi, 41, 1904.
Anopheles maculipennis Quayle (not Meigen), Bull. 178, Agr. Exp. Sta., Berkeley, Cal., 51, 1906.
Anopheles occidentalis Dyar & Knab, Proc. Biol. Soc. Wash., xix, 159, 1906.
Anopheles maculipennis Dyar (not Meigen), Proc. U. S. Nat. Mus., xxxii, 121, 1907.
Anopheles occidentalis Dyar, Proc. U. S. Nat. Mus., xxxii, 121, note, 1907.
Anopheles maculipennis Theobald (in part, not Meigen), Mon. Culic., iv, 26, 1907.
Anopheles occidentalis Theobald, Mon. Culic., v, 85, 1910.
Anopheles occidentalis Knab, Amer. Journ. Trop. Dis. & Prev. Med., i, 36, 1913.

ORIGINAL DESCRIPTION OF ANOPHELES OCCIDENTALIS:

Thorax with a broad dorsal pale lilaceous band, cut by three narrow brown stripes; a broad lateral brown band; pleura pale, with three brown stripes; abdomen, legs and palpi dark brown. Wings with the scales of the veins forming four black spots as in *A. quadrimaculatus*, but rather more rounded and contrasted.

118 specimens, Stanford University, California (Isabel McCracken); San Diego, Sissons and Thrall, California (Dyar & Caudell); Portland, Oregon (R. P. Currie); Revelstoke, B. C. (H. G. Dyar); Boise, Idaho (J. M. Aldrich); Lehi, Utah (W. A. Hooker).

Type.—Cat. No. 10,028, U. S. Nat. Mus.

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DESCRIPTION OF FEMALE, MALE, AND LARVA OF ANOPHELES OCCIDENTALIS:

Female.—Proboscis long, straight, slender; labellæ long, lanceolate, dull luteous, with small outstanding black setæ; vestiture appressed, dark brown. Palpi as long as the proboscis, uniform, slender; vestiture of dark brown narrow scales, roughened at base, a few stiff pale setæ at tip. Antennæ filiform, the joints subequal, rugose, blackish, pilose; hairs of whorls sparse, black, short; tori subspherical, with a cup-shaped apical excavation, small, brown. Clypeus elongate elliptical, brown, nude. Eyes well separated, black. Occiput with a median groove, blackish, densely clothed with erect triangular, or notched, scales, black at the sides, white in a large patch anteriorly, a tuft of white hair-scales projecting forward between the eyes; a row of black setæ along margins of eyes.

Prothoracic lobes lateral, small elliptical. Mesonotum narrow, elongate, brown, strongly gray pruinose in a broad median stripe, a narrow median brown line and the sides broadly dark brown; vestiture of short whitish hair-like scales, densest anteriorly in three broad stripes; some black bristles over roots of wings. Scutellum collar like, luteous, with a marginal row of long blackish bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ brownish and pale intermixed, coxæ luteous, with a few short hairs.

Abdomen subcylindrical, somewhat depressed, truncate at tip, grayish brown, rugose, apical margins of the segments shining black; dorsal vestiture of numerous short yellow hairs, longer dark ones at the sides.

Wings (plate 41, fig. 15) moderate, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell about as long as its cell; basal cross-vein distant about its own length from anterior cross-vein; scales of veins lanceolate, narrow, pointed, of different lengths on different areas, the long ones black, the short ones brown, the black scales forming spots at bases of second marginal and second posterior cells, at the cross-veins and on basal portion of second vein; an ill-defined metallic yellowish-coppery spot at tip of wing upon the fringe, the rest of fringe dusky. Halteres with pale stem and black knob.

Legs long and slender; vestiture brownish-black with a bluish reflection, tips of femora and tibiæ narrowly whitish. Claw formula, 0.0–0.0–0.0.

Length: Body about 5 mm.; wing 5 mm.

Male.—Palpi as long as the proboscis, last two joints swollen and club-shaped, furnished with a tuft of hairs, yellowish towards base; vestiture bronzy black. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with black basal rings; hairs of whorls long, dense, brownish. Coloration as in the female. Abdomen long, depressed, black; lateral ciliation of rather abundant pale hairs. Wings narrower than in the female, stems of the fork-cells longer, vestiture more sparse. Claw formula, 2–0.0–0.0.

Length: Body about 5.5 mm.; wing 4.5 mm.

Genitalia (plate 41, fig. 270): Side-pieces over twice as long as wide, tips conically rounded; a stout seta near middle of inner margin, two approximated ones near base, another pair upon an inner lobe. Clasp-filament long, slightly attenuated mesially, with a small articulated terminal claw. Unci columnar, with a group of stout setæ projecting outward at right angles.

Larva, Stage IV.—The larva is very similar to that of *Anopheles quadrimaculatus*. It differs by the absence of the small rudimentary pair of floats present on the second abdominal segment of that species.

The larvæ live in ground-pools, preferably those of permanent water containing algæ. Miss McCracken found them in a creek, a pasturage trough, tank overflow, roadside pool, and the edges of a lake. Quayle found the larvæ in abundance in distinctly brackish water. Dr. Dyar found them in the grassy edges of lakes and ponds, and, at Chico, California, where they were abundant, in all sorts of water; in Nevada they occurred in pools in irrigated fields.

Western United States, from southern California to Alaska, eastward through Canada to northern Maine.

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Fort Gibbon, Alaska, June 6, 1907 (through C. S. Ludlow); Valley of the Mayo River, Yukon Territory, latitude 63° 45', longitude 136°, 1904 (J. Keele); Aweme, Manitoba, April 23, 1905 (N. Criddle); Little Current River, Ontario, July 18, 1903 (W. J. Wilson); Nagagami River, Seventh Portage, Ontario, June 7, 1903 (W. J. Wilson); Revelstoke, British Columbia (H. G. Dyar); Boise, Idaho, October 21, 1901 (J. M. Aldrich); Lehi, Utah, September 8, 1905 (W. A. Hooker); Reno, Nevada, August 6, September 1–30, October 1–22, 1915 (H. G. Dyar); Steamboat Springs, Nevada, August 19, 1915 (H. G. Dyar); Klamath Falls, Oregon, July 27, 1906 (Dyar and Caudell); Portland, Oregon (R. P. Currie); Thrall, California, July 29, 1906 (Dyar and Caudell); Sisson, California, July, 1906 (Dyar and Caudell); Stanford University, California (I. McCracken); Stockton, California (H. J. Quayle); Fresno, California, April 4 (E. A. Schwarz); Gardena, California, May 30, 1906 (H. G. Dyar); San Onofre, California, June 27, 1906 (H. G. Dyar); Sweetwater Junction, California, June 12, 1906 (Dyar and Caudell); Ottawa, Ontario, September 30 (J. Fletcher); Weld, Maine, July 25, 1910 (H. G. Dyar); Norcross, Maine, July, 1914 (Mrs. H. G. Dyar).

Anopheles occidentalis was long confounded with *A. quadrimaculatus* of eastern North America, and both with the European *A. maculipennis* Meigen. It is, however, distinct, although closely related to both these forms. Its range is more northern than that of *A. quadrimaculatus* and in the extreme north it extends eastward to the Atlantic coast.

ANOPHELES QUADRIMACULATUS Say.

Anopheles quadrimaculatus Say, Keating's Narr. Exp. St. Peter's River, ii, 356, 1824.
Anopheles quadrimaculatus Wiedemann, Ausser. Zweifl. Ins., i, 13, 1828.
Anopheles guttulatus Harris, in Hitchcock's Rept. on Geol., Min., Bot., and Zool. of Mass., 595, 1835. (Nomen nudum.)
Anopheles maculipennis and *quadrimaculatus* Loew (in part), Amer. Journ. Sci. (2), xxxvii, 317, note, 1864.
Anopheles maculipennis and *quadrimaculatus* Walsh (in part), Proc. Ent. Soc. Phil., iii, 215, 1864.
Anopheles annulimanus van der Wulp, Tijdschr. voor Ent., x, 129, 1867.
Anopheles quadrimaculata Howard, U. S. Dept. Agr., Div. Ent., Bull. 4, n. s., 23, 1896.
Anopheles quadrimaculatus Lugger, 2d. Rept. Ent. Minn., 195, 1896.
Anopheles quadrimaculatus Giles, Handb. Gnats or Mosq., 162, 1900.
Anopheles quadrimaculatus Coquillett, U. S. Dept. Agr., Div. Ent., Circular 40, 2 ser., 4, 1900.
Anopheles quadrimaculatus Howard, U. S. Dept. Agr., Div. Ent., Bull. 25, n. s., 21, 32, 1900.
Anopheles quadrimaculatus Th. Smith, Journ. Bost. Soc. Med. Sci., v, 321, 1901.
Anopheles quadrimaculatus Packard, Psyche, ix, 191, 1901.
Anopheles maculipennis Theobald (not Meigen), Mon. Culic., i, 191, 1901.
Anopheles maculipennis Howard (not Meigen), Mosquitoes, 93, 240, 1901.
Anopheles maculipennis Beyer (not Meigen), N. Orleans Med. & Surg. Journ., liv, 146, 1901.
Anopheles quadrimaculatus Veazie, N. Orleans Med. & Surg. Journ., liv, 163, 1901.
Anopheles maculipennis Garman (not Meigen), Bull. 96, Ky. Agr. Exp. Stat., 205, 1901.
Anopheles maculipennis Dyar (not Meigen), Proc. Ent. Soc. Wash., v, 46, 1902.
Anopheles maculipennis Giles (in part, not Meigen), Handb. Gnats or Mosq., 2 ed., 326, 1902.
Anopheles maculipennis Dyar (not Meigen), Proc. Ent. Soc. Wash., v, 141, 1903.
Anopheles maculipennis Theobald (in part, not Meigen), Mon. Culic., iii, 17, 1903.
Anopheles maculipennis Parker, Beyer & Pothier (not Meigen), Bull. 13, Yell. Fev. Inst., U. S. Publ. Health and Mar.-Hosp. Serv., 38, 1903.
Anopheles maculipennis Johannsen (not Meigen), Bull. 68, N. Y. State Mus., 409, 1903.
Anopheles maculipennis Felt (not Meigen), Bull. 79, N. Y. State Mus., 267, 1904.
Anopheles maculipennis Smith (not Meigen), N. J. Agr. Exp. Stat., Bull. 171, 30, 1904.
Anopheles maculipennis Blanchard (American form), Les Moustiques, 160, 1905.
Anopheles maculipennis Smith (not Meigen), Rept. Mosq. N. J., 168, 1905.
Anopheles maculipennis Felt (not Meigen), Bull. 97, N. Y. State Mus., 470, 1905.

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Anopheles maculipennis Aldrich (not Meigen), Cat. N. A. Dipt., Smiths. Misc. Colls., xlvi (part), 121, 1905.
Anopheles maculipennis Jordan & Hefferan (not Meigen), Journ. Infect. Dis., ii, 57, 1905.
Anopheles maculipennis Dyar & Knab (not Meigen), Journ. N. Y. Ent. Soc., xiv, 177, 1906.
Anopheles quadrimaculatus Dyar & Knab, Proc. Biol. Soc. Wash., xix, 159, 1906.
Anopheles maculipennis Coquillett (not Meigen), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 12, 1906.
Anopheles annulimanus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 13, note, 1906.
Anopheles maculipennis Dyar (not Meigen), U. S. Dept. Agr., Bur. Ent., Circular 72, 1, 1906.
Anopheles maculipennis Howard (not Meigen), Osler's Modern Medicine, i, 378, 383, 1907.
Anopheles quadrimaculatus Banta, Fauna Mayfield's Cave, Carnegie Inst. Wash., 36, 84, 1907.
Anopheles maculipennis Theobald (American form), Mon. Culic., iv, 26, 1907.
Anopheles maculipennis (not Meigen) or *quadrimaculatus* Viereck, 1st Ann. Rept. Comm. Health Pa., 469, 1908.
Anopheles quadrimaculatus Thibault, Proc. Ent. Soc. Wash., xii, 24, 1910.
Anopheles maculipennis Theobald (in part, not Meigen), Mon. Culic., v, 5, 1910.
Anopheles quadrimaculatus Morse, Ann. Rept. N. J. State Mus., 1909, 716, 1910.

ORIGINAL DESCRIPTION OF ANOPHELES QUADRIMACULATUS:

Pale brownish; wings with four fuscous spots.

Inhabits North-west Territory.

Thorax dull cinereous; two oblique, brown lines confluent behind and reaching the posterior edge; a broad, lateral, brown line also extending the whole length of the thorax; *wings* hyaline, the nervures hairy, forming two blackish spots near the middle, placed longitudinally; and two others nearer the tip on the bifurcations of the nervures, placed transversely; *scutel* dull ochreous, dusky in the middle; feet black-brown, incisures at tip of the thighs and of the tibiae, yellowish; *tergum* whitish, a little varied with dusky.

Length ♀ to the tip of the wings more than three-tenths of an inch.

Closely allied to the *maculipennis* Hgg. I have not seen the male. Wiedemann informs me that my CULEX *punctipennis* is a true ANOPHELES, an observation which I have found to be correct. I described that insect in the year 1819, before any account of that new genus had reached this country, otherwise I certainly should have adopted it.

ORIGINAL DESCRIPTION OF ANOPHELES ANNULIMANUS:

Fuscus; tibiis anticis albis fusco-annulatis; metatarso postico tibia longiori. ♂. long. 2 lin.

Kop zwartbruin; achterhoofd met grove zwarte beharing. Sprieten witachtig, bruin geringeld; vederbos lichtbruin met gelen weerschijn. Zuiger anderhalf maal zoo lang als kop en thorax, zwartbruin, van boven en aan de spits met lichten weerschijn. Voelers bruin; de beide eerste leden donkerder; het tweede lid een weinig langer dan het eerste, te zamen zoo lang als de sprieten; de beide laatste leden ieder naauwelijks half zoo lang als het tweede, bruingeel, te zamen elliptisch verbreed, schraal met lange haren bezet. Thorax, schildje en achterrug donkerbruin, met fijne gele beharing; van de schouders naar den vleugelwortel een smalle lichtgrijze zoom, die in 't midden eenigzins hoekig naar onderen is uitgebogen; de borstzijden grootendeels lichtgrijs bestoven. Achterlijf naar evenredigheid kort, graauwbruin; de achterzoom der ringen zwartbruin, hetgeen op den buik, waar de grondkleur lichter is, meer in het oog valt; de tang korter dan de laatste lijfsring, met lange omgebogen spitsen; beharing des achterlijfs matig digt, fijn, van blonde kleur. Pooten donkerbruin; de heupen en de wortel der dijen bruingeel; het uiteinde der dijen bijna zwart, waartegen de bleekgele of witachtige kniespitsen duidelijk uitkomen; digt bij den wortel der middendijen is een witachtige ring, aan beide zijden begrensd door eene bruine keur, donkerder dan de grondkleur; de voorscheenen, met uitzondering van het wortel-derdedeel, witachtig, met drie donkerbruine ringen, waarvan de laatste zeer kort voor de spits, die weder wit of geelachtig is: die lichte kleur bevindt zich ook aan de spits der overige scheenen; de achterpooten zijn lang en dun, vooral de tarsen, waarvan het eerste lid een vierde langer is dan de scheenen. Kolfjes zwartbruin, de steel en de wortel van den knop lichter. Vleugels langer dan het achterlijf, met flaauwe graauwachtige tint; aderen en schubben bruin; in 't midden onder den voorrand, op de tweede langsader, bevindt zich een vlekje en een weinig verder, over de kleine dwarsader, een tweede, beiden door ophooping van schubbetjes gevormd; de bovenste basaal-cel is iets langer dan de onderste.

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DESCRIPTION OF FEMALE, MALE, LARVA AND EGG OF ANOPHELES QUADRIMACULATUS:

Female.—Proboscis long, straight, slender; labellæ long, lanceolate, dull, luteous, with small outstanding black setæ; vestiture appressed, dark brown. Palpi as long as proboscis, uniform, slender; vestiture of dark brown narrow scales, roughened at base, a few stiff setæ at tip. Antennæ filiform, the joints subequal, rugose, blackish, pilose; hairs of whorls sparse, black, short; tori subspherical, with a cup-shaped apical excavation, small, blackish. Clypeus elongate elliptical, dark brown, nude. Eyes well separated, black. Occiput with a median groove, blackish, densely clothed with erect, triangular, or notched scales, black on the sides and at extreme base, whitish anteriorly, a tuft of long white hair-scales projecting forward between the eyes; a row of black setæ along margins of eyes.

Prothoracic lobes lateral, small, elliptical. Mesonotum narrow, depressed, brown, three darker longitudinal stripes on the disk, grayish pruinose on posterior third, sides behind middle dark brown; vestiture of coarse pale yellowish hair-scales, densest over the three dark stripes, some stiff bristles over roots of wings. Scutellum collar-like, dark brown, with a marginal row of pale brown bristles. Postnotum elliptical, prominent brown, nude. Pleuræ and coxæ brownish luteous, with a few short hairs.

Abdomen subcylindrical, somewhat depressed, truncate at tip, luteous brown, the apices of the segments broadly blackish; vestiture of numerous pale bristles arising from small black punctures.

Wings (plate 41, fig. 22) moderate, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell about as long as its cell; basal cross-vein distant about its own length from anterior cross-vein; scales of veins lanceolate, narrow, of different lengths on different areas, the long ones black, the short ones brown, the black scales denser and forming spots at the bases of the second marginal and second posterior cells, at the cross-veins and origin of second vein. Halteres with pale stem and black knob.

Legs long and slender; vestiture brownish-black, tips of femora and tibiæ narrowly yellowish white. Claw formula, 0.0–0.0–0.0.

Length: Body about 5 mm.; wing 5 mm.

Male.—Palpi as long as the proboscis, the last two joints swollen and club-shaped, with many long brown hairs with yellow silky luster; vestiture bronzy black. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, pale, with narrow black basal rings; hairs of whorls long, dense, brownish with yellow silky luster. Coloration as in the female. Abdomen long, depressed, somewhat broadened distally, black, the margins of the segments narrowly luteous, hairs of dorsum yellowish; lateral ciliation coarse and irregular, brown. Wings narrower than in the female, stems of the fork-cells longer, vestiture more sparse. Claw formula, 2–0.0–0.0.

Length: Body about 5.5 mm.; wing 4.5 mm.

Genitalia (plate 39, fig. 262): Side-pieces longer than wide, conical, a stout seta at middle, at base two spines from a common base, an inner setose lobe bearing four unequal spines in two groups, the outer pair with rounded tips. Clasp-filament as long as side-piece, slender, slightly enlarged at base and apex, with a short and stout articulated terminal spine. Unci slender, columnar, with two tufts of spines at tip, bent outward at right angles. Basal appendages large, delicate, leaf-like.

Larva, Stage IV.—Head rounded, longer than wide, bulging at the sides, frontal portion before insertion of antennæ conically produced; dorsal head-hairs single but numerously branched, in a line between antennæ, a smaller hair at base of antennæ; two long approximate setæ on front margin. Antennæ subcylindrical, slightly tapered, spined on one side; a tuft of four hairs at basal two-fifths; two long dentate articulated terminal processes, one short one and a small hair-tuft. Eyes large, pointed. Mental plate small, with a median tooth and four on each side, perpendicular, the first and second lateral ones

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subequal, the second pointed, the third distant, the fourth moderate. Mandible quadrangular, convex without; five large branched hairs on dorsal aspect in a line, two smaller ones near them; two pairs of flat appendages near tip, the distal pair feathered; an outer row of cilia; terminal dentition of eleven teeth, upper third and fourth produced; two filaments above, three within; a square finely dentate process below; a thick process at end of dentition, one at base, between these a row of setæ, the central ones longest. Maxilla rounded rectangular, the palpus attached by a narrow constriction; numerous short setæ and spines on inner aspect; palpus with round projecting base, a dendritic tuft within, five terminal digits and two flattened appendages. Thorax rounded quadrate, about as long as wide; hairs short, consisting of branched hairs, single hairs and tufts, mesothorax sparsely haired. Abdomen stout, anterior segments shorter; long feathered lateral hairs on first three segments, double on first and second, single on third; posterior hairs small, smooth; a dorsal series of six pairs of fan-shaped tufts on second to seventh segments (plate 130, fig. 453), the first pair sparse. Air-tube sessile, subquadrate, roundedly angled posteriorly. Lateral plates of eighth segment posteriorly with a series of spines irregularly long and short. Anal segment about as long as wide, with a small dorsal plate; dorsal brush a long and a short tuft on each side; a single long lateral hair below the plate; ventral brush well developed, of long branched tufts. Anal gills moderate, about as long as the segment, slightly constricted centrally, blunt pointed.

Egg (plate 147, fig. 695 *).—Fusiform, somewhat more pointed at one end than the other, black, lower surface coarsely reticulate, dorsal surface granular; lateral floats occupying about half of the lateral margins and arcuately produced, dorsally in the middle approaching very close to the median line.

The larvæ occur in natural collections of water of a more or less permanent nature. They often occur in the same locations with the larvæ of *Anopheles punctipennis* and mixed with them, but generally in much lesser numbers. They are more addicted to permanent stagnant water, such as the edges of sluggish rivers and marshes containing algæ, less to springs and running water, and do not occur in temporary ground pools filled by rains. It would appear that the species breeds also in brackish water, although we have no personal observations in confirmation. The female is an eager blood-sucker and readily enters houses. The species hibernates in the female adult state.

North America east of the Rocky Mountains from Canada to Mexico.

Center Harbor, New Hampshire, August 1, 1902 (H. G. Dyar); Berlin Falls, New Hampshire, August 9, 1868 (F. G. Sanborn); West Springfield, Massachusetts, May 22, 1903 (F. Knab); Westfield, Massachusetts, August 23, 1903 (F. Knab); Pine Orchard, Connecticut, July 19, 1903 (F. H. Hart); Ithaca, New York, June 30, 1903 (O. A. Johannsen); Bayside, Long Island, New York, August 14, 1901 (H. C. Weeks); Bellport, New York, August 27, 1901 (H. G. Dyar); West Fairview, Pennsylvania, August 18, 1900 (H. B. Bashore); Chesapeake Beach, Maryland, July 4, 1903 (A. Busck); Jackson's Island, Maryland, July 29 (H. S. Barber); Plummer's Island, Maryland, August 31, 1902 (H. S. Barber); Lakeland, Maryland, August 8, 1905 (F. C. Pratt); Washington, District of Columbia, October 29, 1902 (Miss Champney); St. Elmo, Virginia, May —— (F. C. Pratt); Rives, Tennessee, July 27, 1904 (H. S. Barber); Agricultural College, Mississippi, November 2, 1903 (G. W. Herrick); Belzona, Mississippi, August 5, 1904 (H. S. Barber); Tutwiler, Mississippi, August 2, 1904 (H. S. Barber); Osprey, Florida, July 25, 1901 (J. G. Webb); Oneco, Florida, May 26, 1900 (H. A. Gossard); Spring Grove, Florida, September 20, 1901 (A. O. Hiscock); Fort Myers, Florida, March 18, 1905 (A. N. Caudell); Sanford, Florida, March 17, 1905 (Dyar and Caudell); Warner's Camp, Lake Okeechobee, Florida, March, 1906 (J. H. Egbert); Sugar Loaf Beach, Lake Okeechobee, Florida (J. H. Egbert); Ruddock, Louisiana, May 10, 1901 (———); New

* The figure shows the dorsal aspect of the egg, not the ventral as stated on the plate.

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Orleans, Louisiana, May, 1904 (C. E. Riggs); Lake Catherine, Louisiana, June 5, 1901 (G. E. Beyer); Baton Rouge, Louisiana, May 12, 1904 (E. S. G. Titus); Victoria, Texas, November 20, 1902 (———); Dallas, Texas, September 14, 1905 (W. E. Hinds); Hotchkiss, Colorado, August 20, 29, 1911 (G. P. Weldon); Delta, Colorado, July 18, 1911 (G. P. Weldon); Logan, Cache County, Utah, October 15, 1913 (C. T. Vorhies); Utah County, Utah, September, 1910 (C. T. Vorhies); Helena, Arkansas, July 30, 1904 (H. S. Barber); Little Rock, Arkansas, July 11, 1904 (H. S. Barber); Fort Smith, Arkansas, July 7, 1904 (H. S. Barber); Scott, Pulaski County, Arkansas, August 11, 1909 (J. K. Thibault, Jr.); St. Louis, Missouri, June, 1904 (A. Busck); Urbana, Illinois, September 29, 1904 (F. Knab); Lake Maxinkuckee, Indiana (B. W. Evermann); Saxeville, Wisconsin, June 17, 1909 (B. K. Miller); Osceola, Wisconsin, April 10, 1903 (———); Santiago Maravatio, Salvatiera, State of Guanajuato, Mexico (A. Dugès); Tampico, Mexico (J. Goldberger). Reported also from Vera Cruz, Mexico (Parker, Beyer and Pothier).

This species has been generally considered the *Anopheles quadrimaculatus* described by Say in 1824, but it appears that the name in reality applies to the form herein treated under the specific name *occidentalis*. This is apparent from the distribution and from Say's locality, "North-west Territory." Unfortunately we did not make this observation in time to introduce the necessary corrections in the text. The present species should be known as *Anopheles guttulatus* Harris. The name *guttulatus* was introduced without description for a probable variety of *quadrimaculatus*, and its significance being clear by association, it can be considered available. In 1864 Loew treated the species as identical with the European *Anopheles maculipennis* Meigen, and also referred his *Anopheles pictus* from Asia Minor as a synonym of it. American authors, however, held it distinct, until Theobald, in 1901, again referred it as a synonym to *A. maculipennis*. Blanchard and Theobald subsequently refer to our species as the American form of *maculipennis*. Dyar and Knab, in 1906, again distinguished the species and adopted the name *quadrimaculatus*. Van der Wulp, in 1867, described a male collected by Thore Kumlien in Wisconsin as *Anopheles annulimanus*, and this is said also to belong here.

We are sceptically inclined toward the record from Vera Cruz, Mexico, by Parker, Beyer and Pothier; no fresh material of this species has been received from tropical Mexico and we doubt that its range extends into the tropical zone.

ANOPHELES ATROPOS Dyar & Knab.

Anopheles atropos Dyar & Knab, Proc. Biol. Soc. Wash., xix, 160, 1906.
Anopheles atropos Theobald, Mon. Culic., v, 85, 1910.
Anopheles atropos Knab, Amer. Journ. Trop. Dis. & Prev. Med., i, 36, 1913.

ORIGINAL DESCRIPTION OF ANOPHELES ATROPOS:

Deep black; thorax obscurely lined with violaceous, especially posteriorly. Head, abdomen and legs black, no markings on the pleurae. Wing scales outstanding, uniform, not forming spots, though a little thicker at the usual points, indicating the spottings.

Allied to *A. quadrimaculatus* Say, but rather smaller, and deep black, not brown, the abdomen without traces of the lighter bandings.

Seven specimens, Florida Keys (Dr. Hiram Byrd).

Type.—Cat. No. 10,029, U. S. Nat. Mus.

DESCRIPTION OF FEMALE OF ANOPHELES ATROPOS (MALE AND LARVA UNKNOWN):

Female.—Proboscis long, straight, slender; labellæ long, lanceolate, black, with small outstanding black setæ; vestiture appressed, black. Palpi as long as the proboscis, uniform, slender, clothed with narrow elliptical black scales, roughened at base, a few setæ at tip; an indistinct whitish ring at base of penultimate joint. Antennæ filiform, the joints subequal, rugose, black, with long black pile; hairs of whorls sparse, black, short; tori subspherical, with a cup-shaped apical excavation, small, black. Clypeus elongate elliptical, dark brown, nude. Eyes well separated, black. Occiput with a median groove,

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blackish, the ocular margin and a pair of large transverse spots on the vertex whitish pruinose; clothed with erect triangular or notched scales, black throughout, a tuft of brown hairs projecting forward between the eyes; a row of setæ along margins of eyes.

Prothoracic lobes lateral, small but prominent, bearing many black bristles. Mesonotum narrow, elongate, deep brown, black in a broad median stripe on anterior half and on the lateral areas of posterior half, slightly gray pruinose in two narrow stripes on anterior half and a very broad median stripe on posterior half; vestiture of short brown hair-like scales densest on the disk, some black bristles on the sides. Scutellum collar-like, dark brown, with a marginal row of long blackish bristles. Postnotum elliptical, prominent, nude, dark brown, slightly pruinose. Pleuræ and coxæ blackish brown, pruinose, with a few short hairs.

Abdomen subcylindrical, somewhat depressed, truncate at tip, blackish, rugose; vestiture of numerous short black hairs.

Wings (plate 41, fig. 22) moderate, slightly smoky; petiole of second marginal cell much shorter than its cell, that of second posterior cell slightly longer than its cell; basal cross-vein distant about its own length from anterior cross-vein; scales of veins broadly linear, brownish black, rather dense and uniformly distributed, only very slightly denser at the bases of the fork-cells, not forming distinct spottings. Halteres with pale stem and black knob.

Legs long and slender, vestiture black with a bluish reflection. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 3.5 mm.

Life history and habits unknown.

Southern Florida.

Florida Keys (H. Byrd).

Anopheles atropos is remarkable for the general blackish coloration, involving even the scales of the head and mesonotum. It suggests *A. walkeri* by the uniform scaling of the wings and the palpal rings, which latter, however, are much less distinct than in *walkeri*. We have only the original series, the species being evidently very restricted in distribution.

ANOPHELES WALKERI Theobald.

Anopheles walkeri Theobald, Mon. Culicid., i, 299, 1901.
Anopheles species Beyer, N. Orleans Med. & Surg. Journ., liv, 148, 1901.
Anopheles walkeri Giles, Handb. Gnats or Mosq., 2 ed., 329, 1902.
Anopheles bifurcatus Theobald (in part, not Linnæus), Mon. Culic., iii, 19, 1903.
Anopheles bifurcatus Giles (in part, not Linnæus), Rev. Anophelinæ, 23, 1904.
Anopheles walkeri Blanchard, Les Moustiques, 167, 1905.
Anopheles bifurcatus Theobald (in part, not Linnæus), Mon. Culic., iv, 36, 1907.
Anopheles walkeri Thibault, Proc. Ent. Soc. Wash., xii, 22, 1910.
Anopheles bifurcatus Theobald (in part, not Linnæus), Mon. Culic., v, 11, 1910.
Anopheles walkeri Knab, Amer. Journ. Trop. Dis. & Prev. Med., i, 36, 1913.

ORIGINAL DESCRIPTION OF ANOPHELES WALKERI:

Head with a patch of thin yellow curved scales in front and thin upright black ones on the occiput and sides. Thorax deep brown, with numerous curved hair-like golden scales. Abdomen dark brown to black with dense golden pubescence. Legs unbanded, brown. Wings unspotted, much as in *A. bifurcatus*, but the cross-veins differently disposed.

♀. Head greyish-brown, with a patch of yellow curved scales in front ending in a tuft of yellow hairs between the eyes; behind are long upright black scales with grey tips, a broadish, central, bare line separating the scales into two portions; eyes purplish-brown with a hoary white border, most distinct at the sides; antennæ dark brown, greyish pubescence and black hairs, the first few joints have creamy scales, basal joint round and dark with a few pale scales; proboscis dark brown with some ochraceous reflections a little longer than the palpi; palpi dark brown with ochraceous reflections paler at the tips of the joints and at the apex, thickly scaled along the base; clypeus brown.

Thorax brown when viewed facing strong light, greyish-brown when pointing away from it, with four grey stripes, very clear in some lights on the denuded

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thorax, indistinct in others and in good specimens; the pale lines run as follows: two parallel ones in the middle running along about half the length of the mesonotum, the other two slightly curved, not far distant from the central ones and longer; the whole mesonotum covered with long, scattered, golden, curved, hair-like scales; scutellum pale greyish-brown; metanotum chestnut-brown with a narrow, dark median line; pleurae brown with grey tomentum.

Abdomen blackish-brown clothed with scattered golden hairs, when viewed facing the light shiny-black and metallic.

Legs long, ochraceous-brown with dark brown scales, especially towards their extremities, ventral surface of femora ochraceous-brown; there is also a pale knee-spot on all the legs and a pale spot at the end of the hind tibiae.

Wings with the veins edged with thin, longish, brown scales, mid cross-vein in advance of the supernumerary and posterior cross-veins, the latter distant from the mid more than its own length; stems of the two fork-cells about equal, first submarginal cell a little over twice the length of its stem and longer than the second posterior cell, base of the first cell a little nearer the base of the wing than that of the second posterior cell; fringe all brown.

Halteres with ochraceous stem and a large globular dusky knob.

Length of body, 5.5 to 6 mm., with proboscis, 10 mm.; of wings, 5.5 mm.; of hind legs, 12 mm.

Habitat.—Lake Simcoe, Ontario, Canada (E. M. Walker).

Time of capture.—September.

Observations.—This species closely resembles the European *A. bifurcatus*, but differs from it in regard to the head ornamentation, the browner appearance of the thorax and the relative positions of the cross-veins as shown in Figure 60. When viewed under the microscope in some lights there will be seen four grey thoracic stripes which are also characteristic, especially when the thorax is rubbed. No males were unfortunately sent. All the specimens were taken from beds of reeds close to the low marshy shore of Lake Simcoe. I should not be surprised if this proved to be Wiedemann's *A. ferruginosus* (Auss. Zwei. Ins. p. 12, 1828) from New Orleans, there being a striking resemblance in the thorax.

DESCRIPTION OF FEMALE OF ANOPHELES WALKERI (MALE AND LARVA UNKNOWN):

Female.—Proboscis long, straight, slender; labellæ long, lanceolate, brown, with small outstanding black setæ; vestiture appressed, black. Palpi slightly shorter than the proboscis, uniform, slender, clothed with narrowly elliptical scales, roughened on basal third, black, with dull silvery-white rings at middle of long joint, at the articulations of last two joints and at tip of last one, outer portion of long joint and last two joints with rather coarse bristles. Antennæ moderate, filiform, the joints subequal, rugose, black, with long pile, a few silvery-white scales on second and third joints; hairs of whorls sparse, black, short; tori subspherical, with a cup-shaped apical excavation, small, blackish. Clypeus elongate elliptical, brown, nude. Eyes well separated, black. Occiput with a median groove, blackish, integument at margins of eyes white, vestiture of erect triangular pale scales, their stems dark, some slender recumbent whitish scales anteriorly, a tuft of long white setæ projecting forward between the eyes; a row of black bristles along margins of eyes.

Prothoracic lobes lateral, small, elliptical, with some coarse brown bristles. Mesonotum narrow, elongate, brownish-gray, slightly lighter pruinose in two narrow stripes on anterior half; vestiture of short, sparse, golden brown hair-like scales, slightly denser medianly; bristles at roots of wings coarse, brown. Scutellum collar-like, luteous, with a row of rather dense, long brown bristles. Postnotum pale brownish gray, shining, nude. Pleuræ brown, pruinose; coxæ luteous, with a few short hairs.

Abdomen subcylindrical, somewhat depressed, truncate at tip, brownish-gray, slightly rugose; vestiture of numerous short brown bristles with golden luster.

Wings (plate 41, fig. 21) moderate, hyaline; petiole of second marginal cell much shorter than its cell, that of second posterior cell about as long as its cell; basal cross-vein distant about its own length from anterior cross-vein; scales of veins long and narrow, nearly linear, brownish black, rather uniformly distributed, only slightly denser and darker in the region of the cross-veins and at the bases of the fork-cells. Halteres brownish.

Legs long and slender; vestiture blackish brown, knees and apices of tibiæ paler. Claw formula, 0.0–0.0–0.0.

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Length: Body about 5 mm.; wing 4.5 mm.

Life history and habits unknown.

Eastern North America.

Ottawa, Ontario, August 23, 1900 (A. Gibson), August 16, 1900 (J. A. Guignard); Auburndale, Massachusetts, September 11, 1907 (C. W. Johnson); Westfield, Massachusetts, August 23, 1903 (F. Knab); Addison, Alexandria County, Virginia, November 7, 1909 (A. N. Caudell); Little Rock, Arkansas (J. K. Thibault, Jr.); Terrebonne, Louisiana, March 29, 1901 (G. E. Beyer). Reported also from Lake Simcoe, Ontario (Theobald).

Theobald, in 1903, expressed the opinion that *Anopheles walkeri* is a synonym of the European *A. bifurcatus* (L). and since then it has been treated as such by most writers. There can be little doubt, however, that the two are distinct although very similar in most respects. Our species has the palpi distinctly ringed with white, while *A. bifurcatus* is stated to have the palpi uniformly dark scaled. The most striking point of resemblance is the absence of distinct wing-spots. *Anopheles walkeri* shows only a very slight tendency toward the massing of scales at the bases of the fork-cells, such a conspicuous characteristic for *quadrimaculatus, occidentalis* and the European *maculipennis*. There is some variation; some specimens of *walkeri* show hardly a trace, and none approach *quadrimaculatus* in the development of the scale-spots. Of our species, *A. walkeri* most resembles *A. atropos* in the scaling of the wings. The latter species also shows indications of whitish rings on the palpi, but may be distinguished at once by the very dark body coloring and particularly by the dark scaling of the mesonotum and the absence of white scales from the vertex.

The species is widely distributed in eastern North America, as will be seen from our locality records. Beyer, in 1901, reported it, as an unidentified species, as occurring in abundance in a locality on the coast of Louisiana; we have one of his specimens taken at that time. Since then only isolated specimens have come to hand.

Genus CŒLODIAZESIS Dyar & Knab.

Cœlodiazesis Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 177, 1906.
Anopheles Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 12, 1906.
Anopheles Dyar & Knab (in part), Can. Ent., xxxix, 48, 49, 1907.
Anopheles Williston (in part), Man. No. Am. Dipt., 3 ed., 107, 1908.
Cyclophorus Eysell, Arch. Schiffs- u. Trop.-Hyg., xvi, 421, 1912.

The type species are, of *Cœlodiazesis* Dyar & Knab, *Anopheles barberi* Coquillett; of *Cyclophorus* Eysell, *Anopheles nigripes* Staeger.

Generic Diagnosis of Adult:

Proboscis rather long and slender; palpi long in both sexes, slender in the female, enlarged at the tip in the male. Antennae filiform in the female, the joints with basal whorls, plumose in the male, the joints short, the last two long. Prothoracic lobes remote dorsally, small. Mesonotum convex, rounded, not markedly narrowed or elongate; scutellum collar-like, not lobed. Postnotum nude. Abdomen subcylindrical, blunt at the tip in the female, depressed and with lateral ciliation in the male. Wings with the second marginal cell long and with short stem. Legs long and slender; the claws simple in the female, the male with one of the front claws large and toothed, the other minute.

Generic Diagnosis of Larva:

Head elongate, the antennae rather small, smooth, the head turning easily on the neck; mouth parts adapted essentially for vegetable food, the brushes moderate. Air tube sessile, broad. Abdomen with a dorsal series of short lamellate tufts for attachment of the body to the surface film of the water. Abdominal segments 1–6 with long ciliate lateral hairs. Lateral plates of the eighth segment with a row of long teeth posteriorly. Anal segment with a chitinized dorsal plate, the ventral brush large, strongly feathered.

North temperate zone.

The genus *Cœlodiazesis* was founded on certain larval characters. It was later suppressed; but we resurrect it, as the genus can be recognized in the imago

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by the more rounded mesonotum, a character of generalization, and therefore presumably a valid generic character. The European *Cœlodiazesis plumbeus* (Stephens) and the Himalayan *C. barianensis* (James) belong here. Major S. R. Christopers has recently expressed the opinion that these three forms are identical,* but at least the Indian one is amply distinct. Dr. Adolf Eysell, without knownedge of the work of Dyar and Knab, established a genus for the European form, also upon early-stage characters.

The larvæ live in the water in hollow trees. They feed upon the organic matter in the water, but are also occasionally predaceous upon other mosquito larvæ occurring in the tree-holes. The method of hibernation is unknown, but, as already suggested by Eysell, may be as partly grown larvæ.

The eggs of *Cœlodiazesis* differ from those of *Anopheles* in that the membranous rim acting as float completely encircles the egg. This proves to be the case in all three of the forms known and thus may be safely considered a generic peculiarity. In hatching, the egg is split obliquely about two-thirds of the way round, the inner end of the slit not quite reaching the center of the egg. Doctor Eysell has treated the early stages of the European form very fully (Arch. f. Schiff- u. Tropen-Hyg., xvi, 421–431, 1912), and Major Christophers has treated the Indian species in an equally comprehensive manner (Indian Journ. Med. Res., iii, 489–496, pl., 1916).

CŒLODIAZESIS BARBERI (Coquillett) Dyar & Knab.

Anopheles barberi Coquillett, Can. Ent., xxxv, 310, 1903.
Anopheles barberi Dyar, Journ. N. Y. Ent. Soc., xii, 243, 1904.
Anopheles barberi Dyar, Journ. N. Y. Ent. Soc., xiii, 108, 1905.
Anopheles niger Herrick (*nomen nudum*), Ent. News, xvi, 283, 1905.
Anopheles bifurcatus Blanchard (in part, not Linnæus), Les Moustiques, 164, 1905.
Anopheles barberi Blanchard, Les Moustiques, 620, 1905.
Anopheles barberi Smith, Rept. N. J. Agr. Coll. Exp. Sta., 1905, 671, 1906.
Cœlodiazesis barberi Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 177, 1906.
Anopheles barberi Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 12, 1906.
Anopheles barberi Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 1, 1906.
Anopheles barberi Howard, Osler's Modern Medicine, i, 383, 386, 1907.
Anopheles barberi Theobald, Mon. Culic., iv, 37, 1907.
Anopheles nigripes Theobald (in part, not Staeger), Mon. Culic., iv, 40, 1907.
Anopheles barberi Viereck, 1st Ann. Rept. Comm. Health Pa., 469, 1908.
Anopheles barberi Morse, Ann. Rept. N. J. State Mus., 1909, 716, 1910.
Cœlodiazesis barberi Thibault, Proc. Ent. Soc. Wash., xii, 24, 1910.
Anopheles barberi Theobald, Mon. Culic., v, 12, 1910.
Anopheles nigripes Theobald (in part, not Staeger), Mon. Culic., v, 12, 1910.
Anopheles barberi Knab, Amer. Journ. Trop. Dis. & Prev. Med., i, 36, 1913.

ORIGINAL DESCRIPTION OF ANOPHELES BARBERI:

Near *Walkeri*, but only about half as large, the upright forked scales of the occiput chiefly yellowish-white, body devoid of scales, etc. Black, the base of the antennæ, clypeus, stems of halteres, coxæ, and trochanters yellow, thorax and scutellum yellowish-brown, front portion of the former and the pleura more yellowish, occiput devoid of appressed scales; thorax somewhat polished, thinly bluish-gray pruinose, the hairs and bristles chiefly black, those of the abdomen mostly yellowish, of the coxae yellow; femora with a distinct bluish tinge, tarsal claws simple; wings hyaline, the scales brown, the lateral ones lanceolate, petiole of first submarginal cell about one-third as long as that cell, base of the latter much nearer the base of the wing than that of the second posterior cell, hind cross vein less than its length from the small cross vein; length, 3 mm.

Three females, collected August 14th, 1902, and August 17 and 19, 1903, on Plummer's Island, Maryland, by Mr. H. S. Barber, after whom the species is named. Type No. 6959, U. S. National Museum.

DESCRIPTION OF FEMALE, MALE, LARVA, AND EGG OF CŒLODIAZESIS BARBERI:

Female.—Proboscis moderately long and slender, straight, uniform; labellæ long, lanceolate, dull luteous, with small outstanding black setæ; vestiture appressed, bronzy brown. Palpi nearly as long as the proboscis, uniform; vesti-

* An Indian tree-hole breeding anopheles, *A. barianensis* James=*A.* (*Cœlodiazesis*) *plumbeus*, Haliday. Indian Journ. Med. Res., iii, no. 3, 489-496, pl.; January, 1916.

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ture brown with a blue reflection; setæ rather long, especially at tip. Antennæ filiform, the joints subequal, rugose, blackish, with long pile; hairs of whorls sparse, black, short; tori subspherical, with a cup-shaped apical excavation, small, blackish. Clypeus small, rounded elliptical, dark brown, nude. Eyes narrowly separated, black. Occiput with a median groove, brown, clothed with erect forked scales, dense and pale brownish yellow posteriorly, more sparse and white anteriorly, a tuft of fine white hairs projecting forward between the eyes; a row of black setæ along margins of eyes.

Prothoracic lobes lateral, small but prominent, bearing coarse brown bristles. Mesonotum short, rounded, convex, dull brown, gray pruinose on the disk, the margins almost silvery pruinose, two narrow dark impressed bare longitudinal stripes reaching to antescutellar space; vestiture of rather sparse yellowish short hairs on the disk, scattered long and coarse blackish ones toward the sides and in a denser series over the roots of wings; antescutellar space strongly depressed. Scutellum collar-like, luteous brown, with a marginal row of long black bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ luteous brown with whitish reflections, coxæ yellowish, with a few short hairs, the anterior coxæ with a row of long yellow-brown bristles.

Abdomen subcylindrical, somewhat depressed, truncate at tip, brown, the segments with black apical margins; dorsal vestiture of rather numerous and coarse brown bristles, longer ones at the sides.

Wings (plate 41, fig. 10) moderate, hyaline; petiole of second marginal cell one-third as long as the cell, that of second posterior cell about as long as its cell; basal cross-vein distant about its own length from anterior cross-vein; outstanding scales of veins narrowly lanceolate to almost linear, evenly distributed, uniformly brownish black, those on the costa with a blue and bronzy reflection. Halteres with pale stems and black knobs.

Legs long and slender; vestiture brownish black with a blue and bronzy reflection. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3.5 mm.

Male.—Palpi slightly longer than the proboscis, the last two joints swollen, forming an elongate club, with a few coarse black bristles; scale vestiture bronzy black. Antennæ plumose; last two joints long and slender, rugose, black, pilose, the others shorter, whitish, with black basal rings; hairs of whorls long, dense, brown with yellow silky luster. Coloration as in the female. Abdomen elongate, somewhat depressed, broadened toward tip, black; lateral ciliation long and rather dense, brown. Wings narrower than in the female, the stems of the fork-cells longer, the vestiture more sparse. Claw formula, 3.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3.5 mm.

Genitalia (plate 38, fig. 257): Side-pieces scarcely longer than wide, rounded, a stout seta on inner margin beyond the middle; at base two long spines with contiguous bases, a tuft of long fine hairs from a conical base. Clasp-filament slightly longer than the side-piece and slightly enlarged at base and apex, with a short and stout articulated terminal spine. Unci columnar, short, with a rounded tip.

Larva, Stage IV (see the figure of the entire larva, plate 85).—Head rounded, elongated, longer than wide, tapering before, frontal portion before insertion of antennæ broadly and somewhat flatly arcuate; hairs all very small, simple. Antennæ subcylindrical, short, very slightly tapered, smooth, a single hair at middle; three long, equal, smooth, articulated terminal processes. Eyes inconspicuous. Mental plate small, with a median tooth and five on each side, perpendicular and rounded, the first small, the rest subequal and rather regularly spaced. Mandible elongate quadrangular, slightly convex without; a minute serration on dorsal aspect; two pairs of flat appendages near tip, basal pair ciliate, distal pair bent and with long brush-shaped tips, a pair similar but with smaller appendages just before collar; an outer row of cilia; terminal dentition of seven very large teeth, the third produced, fourth to seventh progressively shorter; a square process of fine dentition, four small retracted teeth within; two

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filaments above, two within; a quadrate process at end of dentition, a slender one at base; a row of setæ outwardly, the inner ones longest. Maxilla rounded rectangular, palpus attached perpendicularly by a pseudoarticulation; numerous hairs and divided filaments on inner aspect; palpus angled at base, short, not longer than the maxilla, a row of short spines on inner aspect, four terminal digits and two small hair-tufts. Thorax rounded quadrate, about as long as wide; hairs short, consisting of feathered hairs and a few short simple ones, mesothorax sparsely haired. Abdomen moderate, anterior segments short; long, feathered lateral hairs, double on first two segments, single on third to sixth; a dorsal series of four pairs of fan-shaped tufts on third to sixth segments (plate 130, fig. 462). Air-tube sessile, subquadrate, roundedly angled posteriorly. Lateral plates of eighth segment posteriorly with a series of long spines without any shorter ones between. Anal segment about as long as wide, with a dorsal plate finely spined behind; dorsal brush of two tufts on each side; ventral brush well developed, of long branched tufts. Anal gills moderate, about as long as the segment, slightly tapered, blunt pointed.

Egg.—Short fusiform, strongly tapered toward both ends, black, the surface finely granulate; float consisting of a thin membrane which entirely covers the dorsal surface (in normal position of egg upon the water) and projects as a narrow rim along the entire margin, this rim very narrow and crenulate at the ends, broader at the sides and with a series of numerous impressed transverse lines.

The eggs were obtained from captured females by Mr. Barber; they are laid separately upon the surface of the water. The larvæ are found only in water in tree-holes, in company with larvæ of *Aëdes triseriatus* and *Orthopodomyia signifer* and also with *Megarhinus septentrionalis*. The larvæ probably feed normally upon small organisms, but have been observed to devour other mosquito larvæ with which they were associated. Dr. Dyar obtained small larvæ late in the fall, which failed to mature before winter. It is possible that the larvæ hibernate, but the hibernation may be normally as adult. This species occurs, with other mosquitoes breeding in tree-holes, in forested regions, often when the country is so dry that no other mosquitoes are found.

Eastern United States.

Plummer's Island, Maryland, August 17, 1905 (H. S. Barber); Cabin John, Maryland, October, 1908 (F. Knab); Bluemont, Virginia, July 29, 1904 (F. C. Pratt); Woodstock, Virginia, August 9, 1904 (F. C. Pratt); Tryon, North Carolina (H. G. Dyar); Columbia, South Carolina, August 1, 1906 (A. C. Moore); St. Louis, Missouri, August, 1904 (A. Busck); Agricultural College, Mississippi, October 15, 1905 (G. W. Herrick); Scott, Arkansas, October 2, 1908 (J. K. Thibault, Jr.). Reported also from New Jersey (Smith).

Cœlodiazesis barberi has recently been placed by Major Christophers of India in the synonymy of the European *C. plumbeus* (Stephens).* This latter has been generally treated under Staeger's later name, *Anopheles nigripes*. We have for some time considered this synonymy as highly probable, but in the absence of European material for comparison we prefer to treat the American form as distinct. Major Christophers also includes in the synonymy *Cœlodiazesis barianensis* (James), from the Himalayas, but his description of this last shows that it is abundantly distinct. Among other characters, he states that the mesonotum has "in the centre a line of white scales (plume-like str. 6) extending from the anterior promontory about half way to the level of the origin of the wings." No such scales exist in our species. The larva has five pairs of abdominal fan-shaped tufts, while *barberi* has but four. It appears that *Cœlodiazesis barberi* has been identified by Theobald and others as the European *Anopheles bifurcatus* (L.) and *C. plumbeus;* from the former it is, of course, amply distinct, the chief resemblance being the unspotted and uniformly scaled wings.

* Indian Journ. Med. Res., iii, 490, 1916.

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APPENDIX.

CORRECTIONS AND ADDITIONS.

Such errors as have been noted in the preceding volumes since their appearance are corrected in the following. In a few cases, where it seemed essential, supplementary notes are given. A few new species from the region included in this work have been published since the appearance of volume three. These are noted in the following under their appropriate generic headings, so that the systematic field may be covered to the present time. In a few cases supplementary matter relating to certain species is added.

Since the manuscript of our last volume was prepared, two of the included species have proved to be synonyms of others. The number of species actually treated in this work is therefore 380, instead of 382, as stated in the introduction to volume three, page v. Adding to these the species previously mentioned as not included and the ones described since the appearance of volume three, we have a total of 398 described species from the region included in this work.

VOLUME I.

Page 108. The statement beginning on the last line and crediting Hagen with the observation of mosquitoes attacking the chrysalids of butterflies proves to be incorrect. The flies actually observed sucking chrysalids were a species of *Simulium*. In this connection Hagen suggested that perhaps mosquitoes might do likewise and that this might account for their presence in large numbers in wild regions where but few warm-blooded animals existed*

Page 190, line 20. For "sporogonic" read "schizogonic."

Page 202. "The mosquitoes that carry malaria." In writing this chapter we have depended in a considerable measure upon the compiled lists of species appearing in text-books on tropical medicine. Especially does this apply to the Old World species, as a sifting of the extensive literature bearing on this subject was beyond our powers. It now appears that these lists are far from reliable. No attempt is made here to present a revised list of malaria transmitters, for this would involve, on the one hand a critical study of the literature involved, and on the other hand a careful synonymic revision of the anophelines themselves. Besides, the mere fact that experimentally this or that species has developed the malarial parasites is, by itself, of little significance. In any case the careful worker will go back to the original sources and judge their value for himself.

Since the preparation of our work, careful systematic studies have been made of the Old World anophelines and to these we refer the reader. For the African species we especially recommend the papers of Edwards.† For the Oriental forms excellent work has been done by Stanton ‡ and by Christophers.§ The

* Hagen, H. A., *Simulium* feeding upon chrysalids. Ent. Mo. Mag., vol. 19, 1883, pp. 254-255.

† Some new West African species of Anopheles (sensu lato), with notes on nomenclature. Bull. Ent. Res., vol. ii, pp. 141-143, 1911.

A key for determining the African species of Anopheles (sensu lato). Bull. Ent. Res., vol. iii, pp. 241-250, 1912.

‡ The Anopheles mosquitoes of Malaya and their larvæ, with some notes on malaria carrying species. Journ. London Sch. Trop. Med., vol. ii, 1912.

The Anopheles of Malaya, Part i. Bull. Ent. Res., vol. iv, pp. 129-133, 1913.

The Anopheles of Malaya, Part ii. Bull. Ent. Res., vol. v, pp. 129-132, 1914.

Notes on Sumatran Culicidæ. Indian Journ. Med. Res., vol. iii, pp. 251-258, 1915.

§ A revision of the nomenclature of Indian Anophelini. Indian Journ. Med. Res., vol. iii, pp. 454-488, 1916.

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latter author also indicates the malarial relation, where known, together with the bearing of the species in question upon the epidemiology.

Turning to our American species, it appears that we listed as transmitters species that had not been proved to be such at that time.

Anopheles punctipennis has been recently proved capable of transmitting malaria by Dr. W. V. King.*

Anopheles crucians, which had not been definitely proved a malaria transmitter at the time we wrote, has also been demonstrated such by Dr. W. V. King.†

Anopheles grabhamii appears in a number of compilations as a malaria transmitter. We have failed to find any records of investigations with this species. Apparently a statement by Theobald, "probably it also is the definitive host of the malarial parasites," ‡ has been converted into a positive one by the compilers.

Volume II.

Plate 147, explanation of figures:

Fig. 693. For "dorsal" read "ventral."

Figs. 694, 695, 696. For "ventral" read "dorsal."

Volume III.

Page 21, line 21. Insert "of the" before "mesonotum."

Genus *Sabethes* (page 23).

Sabethes goeldii, new species (page 24, footnote), should have been included in the text as it occurs within the geographic limits included in this work. However, this was impossible, as the specimen from Trinidad came to hand after the volume was already in type. The species was first recognized as new from Goeldi's figure, which, by comparison with the actual specimen, proves to be an excellent representation.

Genus *Wyeomyia* (page 49).

Wyeomyia grenadensis Edwards (Bull. Ent. Res., vol. vi, 1916, p. 363). Grenada, West Indies.

Page 162, line 7 from bottom. For "*Lestitocampa*" read "*Lesticocampa.*"

Genus *Culex* (page 215).

The following species have been described since the appearance of volume three:

Culex aseyehæ Dyar and Knab, Ins. Insc. Menstr., vol. iii, p. 112, 1915. Bahama Islands.

Culex anips Dyar, Ins. Insc. Menstr., vol. iv, p. 48, 1916. San Diego, California.

Culex brehmei Knab, Proc. Biol. Soc. Wash., vol. xxix, p. 161, 1916. New Jersey.

Page 301. *Culex sphinx* Howard, Dyar & Knab. A description of the larva, by Dyar and Knab, will be found in Insecutor Inscitiæ Menstruus, vol. iii, 1915, p. 114.

Page 316. *Culex erythrothorax.*

The scales of the mesonotum are of the "minute hair-like" type, though rather longer than in *C. similis* and allies, but not of the "narrow curved" type as described.

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* The rôle of *Anopheles punctipennis* Say in the transmission of malaria. Science, N. S., vol. 42, pp. 873-874, 1915.

Anopheles punctipennis, a host of tertian malaria. Amer. Jour. Trop. Dis. & Prev. Med., vol. iii, pp. 426-432, pl. 8, 1916.

† Experiments on the development of malaria parasites in three American species of Anopheles. Journ. Exper. Med., vol. xxiii, pp. 703-716, pls. 98-105, 1916.

‡ Mosq. or Culic. Jamaica, 1905, p. 18, and Mon. Culic., vol. iv, 1907, p. 56.

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Page 317, line 12 (*Culex erythrothorax*). Dele "are translucent and." According to more recent observations by Doctor Dyar, the translucent larvæ occurring in the same situations with those of *erythrothorax* are those of *C. tarsalis*.

Page 343. The statement on the last two lines, that *Culex similis* is the only species with "minute hair-like" scales on the mesonotum known to us from the West Indies, is incorrect. *Culex microsquamosus* from Jamaica also shows this characteristic.

Page 359, line 11 from bottom. For "particular" read "particularly."

Page 362, line 15. After second word insert "[Culex pipiens]."

Page 403. *Culex microsquamosus*. The scales of the mesonotum are of the "minute hair-like" type and rather sparse, as in *Culex similis* and *C. salinarius*. It should have been grouped with these species in the table (page 220).

Page 516. *Mansonia titillans*. The eggs and mode of oviposition have been recently described by Dyar and Knab from notes and specimens kindly furnished by Prof. Harold W. B. Moore, of British Guiana.* The eggs are disposed in a cluster attached to the under surface of the floating *Pistia* leaves and project downward into the water.

Volume IV.

Genus *Aëdes* (page 607).

In addition to those already mentioned in our introduction to volume three, the following species has not been included in the text:

Aëdes borealis (***Culex borealis*** Ludlow, Can. Ent., vol. xliii, p. 178, 1911). Alaska.

This species belongs in the group of boreal forms having black legs and variable thoracic ornamentation. Being described from a female, the species must remain unrecognized, species in this category being for the most part distinguishable only by larvæ or male genitalia.

The following species, too recently described for inclusion in this work, are all from the mountains of California:

Aëdes tahoënsis Dyar, Ins. Insc. Menstr., iv, 82, 1916.
Aëdes hexadontus Dyar, Ins. Insc. Menstr., iv, 83, 1916.
Aëdes ventrovittis Dyar, Ins. Insc. Menstr., iv, 84, 1916.
Aëdes cataphylla Dyar, Ins. Insc. Menstr., iv, 86, 1916.
Aëdes increpitus Dyar, Ins. Insc. Menstr., iv, 87, 1916.
Aëdes palustris Dyar, Ins. Insc. Menstr., iv, 89, 1916.

Page 687. *Aëdes sansoni*.

The specimens cited from Eureka and Fieldbrook, California, belong to *Aëdes increpitus* Dyar. Our discussion of them should be cancelled.

Page 740. *Aëdes pullatus*.

The specimen cited from Summit, California, belongs to *Aëdes tahoënsis* Dyar. The record should be omitted.

Page 824. *Aëdes calopus* = *Aëdes argenteus* (Poiret).

The original description of *Culex argenteus* Poiret is quoted and discussed by Knab in a recent paper.†

Page 927. *Uranotænia anhydor*.

Description of Female, Male and Pupa of Uranotænia anhydor:

Female.—Proboscis moderate, much dilated at apex, labellæ conical; vestiture of black scales. Palpi very short, slightly exceeding the clypeus, with black setæ especially at the tips. Antennæ long and slender, the joints subequal,

* Eggs and oviposition in certain species of Mansonia. Ins. Insc. Menstr., vol. iv, pp. 61-68, 1916.

† The earliest name of the yellow fever mosquito. Ins. Insc. Menstr., vol. iv, 1916, pp. 59-60.

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rugose, pilose, black, with long coarse ciliation, the joints scarcely thickened at the insertions of the whorls; tori globose, with an apical excavation, ocherous, with a dark brown spot on inner side. Clypeus large, convex, conical, pale brown. Eyes narrowed above, not contiguous, black with a green reflection. Occiput with flat recumbent scales, black, brown below, the margins of the eyes silvery white; erect forked scales on the nape dark; bristles along margins of eyes coarse, long, black, directed forward.

Prothoracic lobes well separated, moderately large, brown, with a narrow line of pale violet scales and with a few black bristles. Mesonotum rather light brown, the bristles forming dark median and subdorsal lines; clothed rather sparsely with minute hair-like bronzy brown scales; a short line of pale violet ones on anterior angles of disk and another before roots of wings; bristles coarse, black. Scutellum with the median lobe large, lateral lobes prominent, each lobe with a group of black setæ. Postnotum yellow-brown, broad, nude, shining. Pleuræ brown, with small patches of violet scales; coxæ brown, sparsely black-scaled.

Abdomen cylindrical, blunt at tip; dorsal vestiture black, bronzy at the bases of the segments; a row of small, round, silvery white lateral spots, situated basally on the segments; ventral vestiture of dirty white scales; marginal cilia of segments abundant, dense, pale.

Wings rather broad, hyaline; second marginal cell moderate, a little shorter than its petiole; second posterior cell also shorter than its petiole; basal cross-vein about its own length from the anterior cross-vein; scales of veins black, the outstanding ones long, ligulate. Halteres whitish, with dark knobs.

Legs slender, rather long; vestiture black; femora silvery white below nearly to tips. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 2.7 mm.

Male.—Proboscis straight, moderately long, distinctly enlarged toward apex. Palpi very short, slightly exceeding the clypeus. Antennæ plumose, rather long, the last two joints long and slender, rugose, brown, with long pile, the others shorter, subcylindrical, with dark rings at the insertions of the hair-whorls. Coloration similar to that of the female. Abdomen subcylindrical, rather more slender than in the female, with many coarse bristles on the genitalia; brown, tips and sides of segments black, no white spots. Wings rather narrower than in the female, the stems of the fork-cells longer, the second marginal cell being less than half the length of its petiole; vestiture sparser. Claw formula, 0.0–0.0–0.0; one claw of the mid legs very large, the other of usual size.

Length: Body about 3 mm.; wing 2.3 mm.

Genitalia: (Not microscopically prepared.)

Pupa.—Cephalothoracic mass subpyriform, the abdomen slender, curved around, the ends of the paddles reaching the prominence between the eyes. Air-tubes rather long and slender, slightly expanded at tip, twisted at base, pale, with a black central band. Hair-tufts small and fine, the pair at base of abdomen feathery. Color luteous whitish, a dark gray stripe on dorsum of thorax and abdomen; eyes black.

Recently Doctor Dyar rediscovered the larvæ in a pond near the mouth of the San Diego River and succeeded in rearing the adults. The larvæ occurred in the fringe of cat-tails and *Lemna* and as on the previous occasion were associated with larvæ of *Anopheles* and *Culex*. The larvæ are fond of resting in an oblique position, with the air-tube at the surface, the mouth holding to a root of *Lemna* or other object. They remain perfectly quiet in this position for a long time. They do not feed continuously, as with *Culex*, but feed rapidly along a root or floating object or side of the receptacle, with a biting motion, then reassume the position of rest.

Old Town, San Diego, California, May 1, 1916 (H. G. Dyar).

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